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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 49444 - 50421.

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49444-50421

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U.S. ENVIRONMENTAL PROTECTION AGENCY
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Research Triangle Park, N. C. 27711

AIR POLLUTION ABSTRACTS

VOLUME 6, NO. 8 AUGUST 1975

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:126, $0.65.

Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts, June 1973 GPO No. EP 4.9:125, $0.70.

Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts, March 1973, GPO No. EP 4.9:121, $2.35.

Air Pollution Aspects of Emission Sources. Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

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Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, $2.00.

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

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Systems Application, Inc., 950 Northgate Drive, San Rafael, California 94903

Contract No. 68-02-1737, Modification No. 3 .... *$65,321*
OPERATE, MAINTAIN AND CALIBRATE AIR MONITORING FACILITIES IN CHATTANOOGA, TENNESSEE.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709 (NOTE: Contract contains options for an additional six months in the 0 amount of $69,745)

Contract No. 68-02-2103, RFP No. Du-75-A099 .... *$123,065*
RESEARCH AND DEVELOPMENT ON ENERGY CONSUMPTION BY WET SCRUBBERS.
Stanford Research Institute, Menlo Park, California 94025

Contract No. 68-02-1211, RFP No. Du-75-B097 .... *$30,000*
DEVELOPMENT OF ADVANCED FILTER MEDIA FOR PARTICULATE MEASUREMENT.
Arthur D. Little, Inc., 15 Acorn Park, Cambridge, Massachusetts 02140

Contract No. 68-02-2219, RFP No. Du-75-B196 .... *$29,319*
RUGGEDIZED GAS FILTER CORRELATION AMBIENT CO MONITOR.
Aeronutronic Ford Corporation, Aeronutronic Division, Ford Road, Newport Beach, California 92663

Contract No. 68-02-1796, RFP No. Du-75-B016 .... *$79,099*
DEVELOPMENT OF EFFECTIVE PARTICULATE SAMPLING TECHNIQUES FOR LOW VELOCITY, UNCONTAINED, SATURATED AND OTHER ATYPICAL SOURCE EMISSIONS.
FluiDyne Engineering Corporation, 5900 Olson Memorial Highway, Minneapolis, Minnesota 55422 (NOTE: Contract contains options in the amount of $77,993)

Contract No. 68-02-1785, RFP No. Du-75-B084 .... *$46,678*
SMOG CHAMBER STUDY OF RATE OF OXIDATION OF SO2 UNDER SIMULATED ROADWAY ATMOSPHERE CONDITIONS.
Calspan Corporation, 4455 Genesee, Buffalo, New York 14221 (NOTE: Contract contains options in the amount of $128,478)

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DEMONSTRATION OF CHEMICALLY ACTIVE FLUIDIZED BED (CAFB) OIL GASIFICATION AND DESULFURIZATION PROCESS.
Foster Wheeler Energy Corporation, 110 South Orange Street, Livingston, New Jersey 07039
(NOTE: Contract contains an estimated definitization of $4,300,000)

Contract No. 68-02-1382, Modification No. 4 to Task Order No. 3................. *$44,420*
IMPACT OF STANDARDS OF PERFORMANCE ON 1985 EMISSIONS - PHASE II.
TRC, The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield, Connecticut 06109

Contract No. 68-02-1880, RFP No. Du-74-A249 .... *$2,407,500*
CONSTRUCTION OF PILOT PLANT FOR CHEMICAL REMOVAL OF PYRITIC SULFUR FROM COAL.
TRW, Inc., TRW Systems Group, One Space Park, Redondo Beach, California

Contract No. 68-02-2208, RFP No. Du-75-B179 .... *$145,470*
HIGH RESOLUTION CONTINUOUS WAVE NUCLEAR MAGNETIC RESONANCE SPECTROMETER.
Varian Instrument Division, 4701 Lydell Drive, Cheverly, Maryland 20781

Contract No. 68-02-2209, RFP No. Du-75-B159 .... *$61,448*
INVESTIGATION OF THE POTENTIAL FOR REPLICATION OF NUCLEAR POLYHEDROSIS VIRUS AND PERSISTENCE OF THE NUCLEIC ACID OF NUCLEAR POLYHEDROSIS VIRUS IN CERTAIN MAMMALIAN CELLS PROPAGATED VITRO.
Intelcom Rad Tech, P. O. Box 80817, San Diego, California 92138

Contract No. 68-02-2060, RFP No. Du-75-C148 .... *$64,000*
DEVELOP A METHODOLOGY FOR THE DETERMINATION OF LINE AND AREA SOURCE EMISSIONS FROM MOTOR VEHICLES FOR THE RAPS PROGRAM.
Washington University, Lindell and Skinker Boulevards, St. Louis, Missouri 63130

Contract No. 68-02-2207, RFP No. Du-75-B085 .... *$73,886*
STUDY OF OXIDANT-PRECUSOR RELATIONS UNDER POLLUTANT TRANSPORT CONDITIONS.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709
(NOTE: Contract contains options in the amount of $96,353)

Contract No. 68-02-0759, Modification No. 10.. *$199,637*
OPERATION AND MAINTENANCE OF AIR MONITORING NETWORK.
Rockwell International Corporation, P. O. Box 1085, Thousand Oaks, California 91366

Contract No. 68-02-1375, Task Order No. 25 .... *$35,000*
CONTINUATION OF ENVIRONMENTAL LEAD MONITORING PROGRAMS IN SILVER VALLEY IDAHO.
PEDCo Environmental Specialist, Inc., Suite 13, Atkinson Square, Cincinnati, Ohio 45246

Contract No. 68-02-1888, RFP No. Du-75-A200.. *$49,985*
EVALUATION OF COMMERCIAL FEASIBILITY OF THE OPTIMUM DISTILLATE OIL BURNER HEAD FOR RESIDENTIAL FURNACES.
Rockwell International Corporation, Rocketdyne Division, 6633 Canoga Avenue, Canoga Park, California 91304

Contract No. 68-02-2047, RFP No. Du-75-C147 .... *$65,000*
EVALUATION OF EMISSION INVENTORY METHODOLOGIES FOR THE RAPS PROGRAM.
Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

Contract No. 68-02-1717, Modification No 2.. *$70,000*
EFFECT OF CHRONIC OR INTERMITTENT EXPOSURE TO RESPIRABLE PARTICLES AND MISTS IN MOUSE PULMONARY INFECTIVITY MODEL.
IIT Research Institute, 10 West 35 Street, Chicago, Illinois 60616

Contract No. 68-02-1881, RFP No. Du-74-A223.. *$1,065,000*
EVALUATION AND DEVELOPMENT OF AN ENVIRONMENTALLY ACCEPTABLE SHALE OIL INDUSTRY.
TRW, Incorporated, Transportation and Environmental Engineering Operations, One Space Park, Redondo Beach, California 90278

Contract No. 68-02-2040, RFP No. Du-75-C191 .... *$27,939*
METHODOLOGY AND EMISSION INVENTORY FOR FUGITIVE DUST FOR THE REGIONAL AIR POLLUTION STUDY.
Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri 64110

Contract No. 68-02-1763, RFP No. Du-75-B056 .... *$25,494*
STUDY OF THE EFFECT OF OZONE ON LUNG FUNCTION IN HUMAN SUBJECTS.
Johns Hopkins University, Charles and 34th Streets, Baltimore, Maryland 21218

Contract No. 68-02-1798, RFP No. Du-75-B100 .... *$62,100*
DEVELOPMENT OF GAS FILTER CORRELATION INSTRUMENTS.
Science Applications, Inc., 1200 Prospect Street, La Jolla, California 92037

Contract No. 68-02-1800, RFP No. Du-75-B073 .... *$95,415*
EVALUATION OF THE EPA REFERENCE METHOD OF MEASUREMENT OF NON-METHANE HYDROCARBONS (NMHC).
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1382, Task Order No. 11 .... *$25,755*
ANALYZE THE IMPACT OF SO2 SOURCES IN AIR QUALITY IN TOLEDO, CINCINNATI, AND AKRON.
The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield, Connecticut 06109

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1975

49444 APTIC NO. 71784

Benson, R. S., W. J. D. Annand, and P. C. Baruah

A SIMULATION MODEL INCLUDING INTAKE AND EXHAUST SYSTEMS FOR A SINGLE CYLINDER FOUR-STROKE CYCLE SPARK IGNITION ENGINE. *Int. J. Mech. Sci., vol. 17:97-124, 1975. 30 refs.*

A model for the prediction of nitric oxide emissions from a single cylinder four-stroke cycle spark ignition engine is described that combines a full power cycle simulation with simulation of the intake and exhaust systems. A rate kinetic model for NO is used based on the assumption that the formation of NO in an engine combustion chamber is a non-equilibrium process. Calculations comparing predicted NO with test results from a single cylinder engine show good agreement over an equivalence range of 0.8-1.1 when the flame speed is corrected at the equivalence (0.9) corresponding to the peak NO. The NO emission is sensitive to the residuals and the exhaust back pressure, both of which are automatically included in the overall simulation model. A program written from this simulation model can be used to assist in the design of intake and exhaust manifolds and to study problems involving the location of thermal reactors, catalytic devices, and exhaust gas recirculating valves, as well as the effects of misfire and maldistribution of fuel-air mixtures.

49445 APTIC NO. 72084

Davids, P.

REDUCTION OF EMISSIONS AND SAVING OF FUEL WITH OIL-FIRED HEATERS. *(Emissionsverminderung und Brennstoffeinsparung bei Oelfeuerungen). Text in German. Gesundh.-Ingr., 96(2):33-36, 1975. 5 refs.*

An evaluation of measurements conducted on about 45,000 pieces of oil firing equipment during the 1972-1973 heating period in Northrhine-Westphalia show a reduction of soot and malodorous substance (oil) emissions, and an increase in carbon dioxide emission, and consequently in the efficiency of the firing equipment. As neither the soot number nor the oil emission or the nitrogen oxides emission showed any significant correlation with the type and design of the firing equipment, further reduction of the soot and oil emissions is possible by process optimization, including a further increase of the carbon dioxide emission to 10-13%, which will result in a further increase in the efficiency. It will be thereby possible to save 2,500,000 tons of oil yearly, which will produce a further emission abatement.

49446 APTIC NO. 72133

Grimbergen, M. van, G. Reybrouck, and H. van de Voorde

AIR POLLUTION DUE TO THE BURNING OF THERMOPLASTICS II. *(Luftverunreinigung, verursacht durch die Verbrennung von Kunststoffen II). Text in German. Zentralbl. Bakteriol. Hyg., Infektionskr. Abt. Orig. B, 160(2):139-147, 1975. 14 refs.*

Thirteen chemically pure polymers were burnt in an electric oven to determine the level of solid and gaseous air pollution caused by their stack gases. All 13 polymers are highly combustible but require different burning temperatures (300-900 C) in order to be burnt completely. With the exception of polymethylmethacrylate (PMMA) and polytetrafluoroethylene (PTFE), all plastics leave a very heavy tar and soot deposit after burning. Burning at low temperature (300 C) gives rise to high concentrations of aliphatic aledhydes. The pH of the exhaust gases, dissolved in water, is neutral to strong acid (PTFE) and will cause severe corrosion. The nitrogen-containing polymers pollute by forming cyanides, nitrogen oxides, and ammonia. High concentrations of fluoride are given off by PTFE. PMMA decomposes in its monomer methylmethacrylate and forms large amounts of aliphatic aldehydes, while ABS (acrylonitrile-butadiene-styrene) and SBR (styrene-butadiene- rubber) cause styrene pollution.

49447 APTIC NO. 71720

Henley, E. D.

RAILWAY ENVIRONMENTAL PROBLEMS. *Railroad Eng. J., no. 1975:4-15, Jan. 1975. 24 refs.*

A review of railway environmental problems relating to air, water, and land pollution and occupational health is presented. Studies of steam versus diesel locomotives operating in tunnels indicate considerable reductions in air pollution resulting from the changeover to diesel locomotives. Comparative data are listed for carbon monoxide, suflur dioxide, nitrogen oxides, carbon dioxide, smoke, and various carcinogenic polynuclear compounds. The reductions are especially significant for sulfur dioxide and polynuclear compounds, with the former being reduced from 15 ppm to 2 ppm and the latter being reduced from levels over 100 micrograms/100 cu m to less than 1 microgram/100 cu m in tunnel atmospheres. Occupational hazards of the railroad industry involving exposure to silica, vanadium, asbestos, welding fumes, lead, antimony, chromium, barium, beryllium, and organic solvents are also reviewed.

49448 APTIC NO. 71713

Kimura, Motoo

UNLEADED GASOLINE. *(Gasorine no muenka ni tsuite). Text in Japanese. Sekiyu Gakkai shi (J. Japan. Petroleum Inst. Tokyo), 18(3):8-12, March 1975.*

One of the biggest problems associated with the use of unleaded gasoline is valve seat recession, for which the material of engine head must be changed if unleaded gasoline is to be used. Since there are an estimated 9,260,000 cars subject to this problem, both leaded and unleaded gasolines are being sold. Decreased octane values are another problem associated with unleaded gasoline. The additon of more olefinic and aromatic hydrocarbons than are now found in leaded gasoline is necessary to obtain the same octane values in unleaded gasoline. The addition of 10% more of these compounds will not affect present air pollution levels greatly; however, the government has directed the petroleum industries not to increase the levels of compounds in unleaded gasoline any higher than the present levels in leaded gasoline. The main intention of unleaded gasoline in Japan is to reduce the atmospheric lead level, while in the U. S. it is to remove catalyst poison.

49449 **APTIC NO. 71816**

Koester, K.-H.

THE LEGAL AND ECONOMICAL IMPORTANCE OF ENVIRONMENTAL PROTECTION WITH SPECIAL REGARD TO THE SUGAR INDUSTRY. *(Die rechtliche und wirtschaftliche Bedeutung des Umweltschutzes unter besonderer Beruecksichtigung der Belange der Zuckerindustrie). Text in German. Zucker, 28(2):87-90, 1975.*

Legal and economical impacts of recent environmental legislation passed in West Germany on the sugar industry are assessed. The establishment and operation of sugar factories as possible sources of air pollution is now subject to authorization and regular inspection, and so are essential modifications in both plant equipment and operation. Best possible means should be used to avert harmful environmental impacts. A safety distance of 500 m should be maintained between sugar factories and adjacent residential buildings. Waste gases with sweetish odor, emitted by beet pulp driers through high stacks, represent the main source of air pollution in sugar factories.

49450 **APTIC NO. 72135**

Meggyes, Attila

CONTRIBUTION TO THE EMISSION CHARACTERISTICS OF DIESEL ENGINES AT TRANSIENT OPERATION. *(Beitrag zum Emissionsverhalten von Dieselmotoren bei instationaerem Betrieb). Text in German. Motortech. Z. (Stuttgart), 36(4):111-115, 1975. 8 refs.*

The exhaust emissions of diesel engines were determined under transient conditions during well-defined acceleration periods. The concentrations under these conditions are clearly different than under stationary conditions. The reason for this is the influence of the combustion chamber wall temperature. Since this temperature is lower for transiently passing through an operating point than under the same, but stationary conditions at that point, the nitric oxide values are lower under transient conditions, while the hydrocarbon values are higher. These differences depend mainly on the load changes and not so much on the relatively small speed changes, since the combustion chamber wall temperature is determined mainly by the load. The exhaust emissions under transient conditions can therefore only be sufficiently determined by stationary measurements if the varying combustion chamber wall temperatures are simultaneously taken into consideration.

49451 **APTIC NO. 72287**

Murao, Tadashi, Shoichi Yasumoto, and Yasunao Fukuchi

POLLUTION AND FREIGHT TRAFFIC. *(Kogai to kamotsu yuso). Text in Japanese. Yuso Tenbo (Transp. News), no. 151:9-32, Jan. 1975.*

The major pollutants from automobiles are carbon monoxide, nitrogen oxides, and hydrocarbons. Gasoline engines also emit lead compounds when alkyl lead is used. The exhaust pipe contributes approximately 50% of the total HC from an automobile while the crank chamber and fuel tank contribute 25% and 20%, respectively. Pollutants from a gasoline engine vary with running conditions and modes. High air-fuel ratios reduce CO and HC concentrations but increase NOx concentration. Electric trains do not contribute significantly to air pollution but power plants which supply the power are major contributors. The Japanese YS-11 aircraft emits 33 ppm CO at climb to 973 ppm at idle, 7.2 ppm NOx at idle to 103.3 ppm at take-off, and 4.9 ppm HC at take-off to 1933 ppm at idle. The concentrations for a B-737 aircraft are 7.7 ppm CO at climb to 620 ppm at idle; 17 ppm NOx at idle to 62.3 ppm at approach; and 1.1 ppm HC at take-off to 303 ppm at idle.

49452 **APTIC NO. 71727**

Ogawa, K.

HEATING FURNACE IN OIL REFINING. *(Seikiyu seisei kanetsu ro). Text in Japanese. Kagaku Kojo (Chem. Factory), 19(2):48, Feb. 1975.*

Air pollutants emitted from oil refineries are mainly sulfur oxides and nitrogen oxides; dust emission is very low. These pollutants are discharged from heating furnaces and boilers associated with processes of evaporation, cracking, and desulfurization in oil refining. Considerable SOx is also discharged from desulfurization plants for flue gases. Oil refineries discharge 1 to 2.5% of the original sulfur in crude oils into the atmosphere. The NOx emission from refineries is much lower than the SOx emission and meets the present NOx emission standard; however, NOx emission control will be needed in the near future when a tighter standard becomes effective. The most likely countermeasure for NOx control in oil refineries is the adoption of a low NOx burner rather than modifying the present facilities to exhaust gas recirculation or staged combustion. The self recirculating gasification burner manufactured by the Nihon Furnace Industrial Co. reduces NOx formation by 22 to 35% for heavy oil and 65 to 83% for gas fuel combustion.

49453 **APTIC NO. 72316**

Sandberg, D. V., S. G. Pickford, and E. F. Darley

EMISSIONS FROM SLASH BURNING AND THE INFLUENCE OF FLAME RETARDANT CHEMICALS. *J. Air Pollution Control Assoc., 25(3):278-281, March 1975. 10 refs.*

Pollutants sampled during the burning of 30 lb of ponderosa pine fuel beds yielded emission factors for carbon monoxide, hydrocarbon gases, and particulate matter of 146, 8.4, and 9.1 lb/ton of fuel, respectively. The application of the flame retardant diammonium phosphate to similar beds resulted in increased emission factors of 166, 11.7 and 19.3 lb/ton of fuel, respectively. Gas chromatographic analysis of the hydrocarbon gases revealed that 15-40% of this material was composed of methane and ethylene. Ethane and acetylene were the next most abundant materials, with photochemically important materials constituting minor portions of this gaseous component. Fuel beds treated with the flame retardant produced more olefins, and this production lasted throughout the smoldering phase of burning. The smoldering phase of combustion appeared to be of major importance to air pollutant production during slash burning. The initial 80% of the fuel burned accounted for only 20-30% of the hydrocarbons and CO emissions, suggesting that a rapid mop-up of slash burns can substantially reduce air pollutant production. (Author abstract modified)

49454 **APTIC NO. 72403**

Scholz, E. J., R. B. Engdahl, and T. T. Frankenberg

SUBMICRON PARTICLES FROM A PULVERIZED COAL FIRED BOILER. *Atmos. Environ., 9(1):111-119, Jan. 1975. 2 refs.*

The size distributions of submicron particles at the inlet and outlet of an electrostatic precipitator serving a coal-fired thermal power plant were measured with a Battelle number 6 cascade impactor and an in-stack Andersen sampler. Scanning electron microscope photographs indicated that most of the particles were spherical with the mean sizes at the precipitator inlet and outlet being 5 and 2.25 micron, respectively. About 50% of the weight of the particles leaving the precipitator appeared to be less than about 2 micron and about 15% were less than 1 micron in size. The majority of the 1.0 micron particles appeared to be condensed materials. (Author abstract modified)

49455 **APTIC NO. 71783**

Wallcave, Lawrence, Donald L. Nagel, James W. Smith, and Ralph D. Waniska

TWO PYRENE DERIVATIVES OF WIDESPREAD ENVIRONMENTAL DISTRIBUTION: CYCLOPENTA(CD)PYRENE AND ACEPYRENE. *Environ. Sci. Technol., 9(2):143-145, Feb. 1975. 14 refs.*

An orange polycyclic aromatic hydrocarbon isolated from a benzene extract of carbon black was identified as cyclopenta(cd)pyrene, the first known cycloalkenyl pyrene derivative. This orange compound was previously isolated from petrochemical atmospheres (in-plant), incinerator soots, and gasoline engine exhaust particles. Previous experiments also demonstrated its ability to induce fibrosarcomas in mice. Characterization of the pyrene by elemental analysis, proton magnetic resonance, mass spectroscopy and ultraviolet-visible spectroscopy resulted in its structural identification and revealed that the benzene extract of the carbon black sample contained 60-fold more cyclopenta(cd) than benzo(a)pyrene. Hydrogenation of cyclopenta(cd)pyrene yielded acepyrene (3,4-dihydrocyclopenta(cd)pyrene). The latter compound is present in relatively abundant concentrations in coal tar pitch. (Author abstract modified)

49456 **APTIC NO. 72263**

Watanabe, Shoji

PROPOSAL OF POLLUTION PROBLEMS. *(Kogai mondai eno teigen). Text in Japanese. Kagaku To Kogyo (Tokyo) (Chem. Chem. Ind.), 49(2):10-16, 1975.*

Petroleum oil consumption in Japan increased from 2.1 million kl in 1930 to 250 million kl in 1972 and the total sulfur emission increased almost 17 times from 1955 to 1972. However, sulfur oxides concentration generally has decreased since 1969 due to successful environmental protection efforts. The most successful effort has been the reduction of sulfur content in fuel by heavy oil desulfurization. The average nitrogen oxides concentration measured at 7 locations in the country increased from 0.0227 ppm in 1968 to 0.0283 ppm in 1972, and the highest 1-hour value has reached 0.34 ppm. The total NO_x emission in Osaka city in 1970 was 151.1 tons/year, in which 119.26 tons/year were from fixed sources. Control of NO_x emission can be achieved by development of flue gas denitration processes and by converting coal and oil to gaseous fuels.

49457 **APTIC NO. 75088**

Zimmerman, John R. and Roger S. Thompson

USER S GUIDE FOR HIWAY, A HIGHWAY AIR POLLUTION MODEL (FINAL REPORT). *Environmental Protection Agency, Research Triangle Park, N. C., Office of Research and Development, Program Element 1AA009, Rept. EPA-650/4-74-008, 68p., Feb. 1975. 7 refs.*

NTIS: PB 239944/AS

A user s guide for a computer model called HIWAY that estimates the concentrations of nonreactive pollutants from highway traffic is presented. The steady-state Gaussian model can be applied to determine air pollution concentrations at receptor locations downwind of at-grade and cut-section highways located in relatively uncomplicated terrain. Each lane of traffic is modeled as though it were a finite uniformly emitting line source of pollution for the at-grade highway. The top of the cut is considered an area source for the cut section, with the area source being simulated by using 10 line sources of equal source strength. The total source strength equals the total emissions from the lanes in the cut. The air pollution concentration represenative of hourly averaging times at a downwind receptor location is found by performing a numerical integration along the length of each lane and a summation of the contributions from each lane. With the exception of receptors directly on the highway or within the cut, the model is applicable for any wind direction, highway orientation, and receptor location. The model was developed for situations in which horizontal wind flow occurs and cannot consider complex terrain or large obstructions to the flow.

1974

49458 **APTIC NO. 72212**

Aschan, Jan C.

WORLD ENERGY CONFERENCE. THE WORLD S ENERGY RESOURCES. *(Varldsenergikonferensen..Har ar varldens energiresurser). Text in Swedish. Tek. Tidskr., 104(17):26, 32, 36, 41, Nov. 1974. 2 refs.*

The world s energy resources are reviewed, and the economical and environmental aspects of the reduction of the sulfur content in fuel oil are discussed. The importance of coal and nuclear energy is expected to increase at the expense of oil, while hydroelectric power plants will continue as marginal energy suppliers. Economical analyses revealed the advantage of the percentagewise reduction of the fuel sulfur content over regional reduction, which latter would imply the use of low-sulfur fuel first in power plants in urban areas, and then also in larger rural power plants. If there were no restrictions on the type of fuel used in power plants, it would be possible to achieve the acquired sulfur dioxide emission abatement by the use of cheap high-sulfur coal in association with emission control devices.

49459 **APTIC NO. 71672**

Ashurov, S. A.

THE USE OF THE CARBON DIOXIDE AND OXYGEN FORMULAE FOR CALCULATING THE EXCESS AIR FACTOR WITH INCOMPLETE COMBUSTION OF A FUEL. *Teploenergetika, 21(3):85-86, 1974. 9 refs.*

The excess air factor with incomplete combustion of a fuel was calculated using the carbon dioxide and oxygen formulae. With incomplete combustion, the excess O_2 content is determined by deducting from the total O_2 content of the dry combustion products the amount of O_2 equivalent to that consumed in oxidizing the combustible components. When there are unburned gases present when burning hydrocarbon fuel, which results in carbon monoxide, hydrogen, and methane being in the flue gases, there is considerable error when using the CO_2 and O_2 formulae. The formulae were improved for calculating the excess air factor from the composition of the combustion products.

49460 **APTIC NO. 71555**

Baum, E. J., R. Henry, and R. L. Pitter

AIRBORNE LEAD FROM REENTRAINED STREET DUSTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 12p., 1974. 3 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 17-19 1974, Paper 74-AP-30.)*

Airborne, soil, and dust particulate samples taken near roadways were analyzed for lead and other elements associated with automobile exhaust and soil contents to investigate the importance of automobiles as a source of airborne lead exposure. The correlation between lead and bromine concentrations found in submicron particulates was extremely good (0.945), indicating that at least 90% of submicron airborne lead is directly emitted by automobiles. Supramicron airborne lead was contributed equally by dusts and direct automotive emissions in the immediate vicinity of heavily traveled streets. Reentrained street dust soils are as important a source of airborne lead as are direct automotive emissions and demonstrate the potential for an even greater contribution than the latter. The large average particle size of reentrained dusts and soils favors large fallout rates, with high exposures being restricted to the vicinity of the street.

49461 **APTIC NO. 72242**

Baumgaertner, Klaus

OXYGEN SUPPLIES FOR LARGE SCALE CONSUMERS IN THE CHEMICAL AND STEEL INDUSTRIES.

(Sauerstoff-Bereitstellung fuer Grossverbraucher in Chemie und Stahlindustrie). Text in German. Chem.-Ing.-Tech.46(21):887-893, 1974. 4 refs.

Annual world production of oxygen by fractionation of air currently runs at about 45 times 10 to the 6th tons, corresponding to about 0.009% of that generated by photosynthesis. Hence this process can hardly have caused any depletion of oxygen in earth s atmosphere. Moreover, air fractionation plants are pollution-free. They emit no waste gases and no odors. The nitrogen emitted by these plants does not lead to an oxygen deficiency in the inhaled air, even on smoggy days. The nitrogen enters the atmosphere with a speed of 10 m/sec so that the diffusion path to total concentration balance is less than 20 m. It is most economical to produce oxygen in very large plants having capacities of about 30,000 N cu m/hr and to supply the consumer directly by pipeline. Where only relatively small quantities of oxygen are required, or larger amounts for only a limited period, tanker delivery is better; very small amounts are delivered most economically in filled evaporators. Should both fractionation products, i.e., nitrogen and oxygen, be required, then on-site production will generally be most favorable. Working with oxygen necessitates safety measures which are set out in detailed and comprehensive form in the accident prevention publication Sauerstoff.

49462 **APTIC NO. 71930**

Beltzer, Morton, Raymond J. Campion, and William L. Petersen

MEASUREMENT OF VEHICLE PARTICULATE EMISSIONS. *Preprint, Society of Automotive Engineers, Inc., New York, 14p., 1974. 9 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974, Paper 740286.)*

An auto exhaust particulate sampling system that allows the simultaneous assessment of both particulate and gaseous emissions from light duty vehicles was built and tested. Measurement of particulate emissions from catalyst equipped vehicles revealed significant quantities of sulfuric acid aerosol emitted. Total sulfuric acid emissions (as sulfate) from a monolithic oxidation catalyst-equipped vehicles (1972 Federal Test Procedure) ranged from 0.010 + or - 0.001 to 0.145 + or - 0.002 g/mi, while sulfuric acid emissions (as sulfate) from pelletized oxidation catalyst-equipped vehicles (1975 Federal Test Procedure) ranged from 0.003 + or - 0.001 to 0.111 + or - 0.026 g/mi. Vehicles equipped with oxidation catalysts only exhibited considerably lower total particulate emissions than vehicles equipped with dual catalyst systems. Increased outputs of nickel and copper were associated with nitrogen oxide reduction catalysts. Platinum emission rates were lower than 0.00002 g/mi.

49463 **APTIC NO. 71910**

Clewell, D. H. and W. J. Koehl

IMPACT OF AUTOMOTIVE TRENDS AND EMISSIONS REGULATIONS ON GASOLINE DEMAND. *Preprint, American Chemical Society, Washington, D. C., 23p., 1974. 32 refs. (Presented at the American Chemical Society, National Meeting, 167th, Los Angeles, Calif., April 4, 1974.)*

Some automotive trends are traced that have contributed to rising gasoline demand in the past and which can be expected to affect it in the future. Based on past trends, gasoline demand has been projected to increase about 50% from 1973 to 1985 at current or 1975 49-state emission levels, and maybe as much as 90% if the statutory nitrogen oxide emission standards of 0.4 g/mi is retained and can be approached only by exhaust gas recirculation. The presently evident trend toward smaller cars, with development of technology to implement the improvements in vehicle efficiency could substantially reduce the rate of growth in gasoline demand. Choosing vehicle emission standards with concern for attainment of air quality standards and conservation of fuel should prevent unnecessary increases in demand. Liquid hydrocarbon fuels are ideally suited for transportation applications. Current shortages are due not only to rising demand for all fuels but also to substitution of petroleum fuels for higher sulfur coal and for scarce gas. To conserve petroleum and to minimize the economic and political costs of importing oil, the rising demand for fuels needs to be moderated, and liquid petroleum fuels should be reserved for premium applications such as transportation, while finding environmentally acceptable ways to use domestic coal and nuclear energy in applications such as power generation that are adaptable to a variety of fuels. (Author summary)

49464 **APTIC NO. 71907**

Craig, Roger A. and Huw O. Pritchard

NO PRODUCTION IN THE SECONDARY ZONE OF A TURBOJET COMBUSTOR. *Preprint, Combustion Inst., Pittsburgh, Pa., 35p., 1974 (?). 16 refs. (Presented at the Combustion Institute Central States Section Spring Technical Meeting, Madison, Wis., March 26-27, 1974.)*

The production of nitric oxide in the secondary zone of a turbojet combustor was calculated. Maximum NO emission is observed when the primary zone of the combustion is operated at stoichiometric conditions. The NO production in the secondary zone is only important under primary zone fuel rich conditions. A novel combustor is suggested in which only a small portion of the fuel is burned at fuel-rich conditions and the remainder burned under fuel-lean conditions. Possible reductions of NO emissions of over a factor of 100 are indicated. The combustion is protracted to low temperatures, and the super-equilibrium concentrations of free radicals during this combustion are important. The NO produced from the combustor cannot be estimated from equilibrium or from the steady-state assumption. (Author conclusions modified)

49465 **APTIC NO. 72079**

Csinady, Laszlo

RELATIONSHIPS OF ENVIRONMENTAL PROTECTION AND PUBLIC HYGIENE. *(A kornyezetvedelem es kozegeszsegugy osszefuggesei). Text in Hungarian. Tatabanyai Szenbanyak Muszaki-Kozgazdasagi Kozl., 14(2-3):89-92, April-Sept. 1974. 11 refs.*

General environmental and hygienic problems of the highly urbanized and industrialized Komarom County in Hungary are described. Industries, mining, power plants, and domestic heating are responsible for very high pollution levels, making this county the most polluted one in the entire country. Air pollution due to settling dust, sulfur dioxide, and fluorides is most problematic, and the situation is aggravated by the promiscuously intertwined industrial and residential areas. The incidence of respiratory tract diseases is highest in this county.

49466 **APTIC NO. 71615**

Davids, Peter and Kurt Gerhards

REFUSE COMPOST PLANTS: REFUSE COMPOSITION AND EMISSIONS FROM INCINERATORS FOR RESIDUAL MATTER. *(Ergebnisse von Muelluntersuchungen und Emissionsmessungen a Resteverbrennungsanlagen in Muellkompostwerken). Text in German. Umwelthygiene, 25(12):273-277, 1974. 5 refs.*

Trash composting plants yield residual matter which may reach up to 20% of the composted trash. This residual matter must be either tipped or incinerated. It contains a high amount of plastics which raises the hydrogen chloride emission in incinerators. However, in most cases the residues from trash composting are incinerated together with bulky refuse and industrial waste products so that about the same HCl content has been measured in these special incinerators as in large trash incinerators. The hydrogen fluoride emission was higher in incinerators for composting residues than in normal trash incinerators, which was due to the higher heating value of this matter. The dust removal problem of incinerators for composting residues is identical with that of large trash incinerators. Through installation of electrostatic precipitators the emission limit of 100 mg/cu m (referred to an oxygen content of the waste gas of 11%) can be met. Venturi scrubbers are usually installed for the reduction of HCl and HF emissions. The cleaned gases contained on the average less than 2 mg HF/cu m and less than 100 mg HCl/cu m.

49467 **APTIC NO. 69462**

Dobbs, M. B.

AIR FORCE POLLUTION EMISSION FACTORS. *Preprint, American Society of Mechanical Engineers, New York, 8p., 1974. (Presented at the American Society of Mechanical Engineers Intersociety Conference on Environmental Systems, Seattle, Wash., July 29-Aug. 1, 1974, Paper 74-ENAs-36.)*

An Air Force Pollution Emission Factors Program is described. A survey of 16 industrial operations plus aerospace ground equipment was performed at McClellan Air Force Base, California, and 498 pollution emission factors were developed. Currently, fully instrumented vans are being developed to provide a field sampling capability for air, water, and solid emissions. Plans call for field sampling of industrial operations at five Air Force bases. Wherever possible, pollution emission factors are obtained from parallel research and development efforts from the literature. Priority 1 pollution emission factors for power check pads, aircraft take-off and landing, and helicopter take-off and landing are to be obtained from the Air Force Weapons Laboratory project, Measurement of Aircraft Engine Emissions. Air pollutants of interest include: particulates, carbon monoxide, methane, total hydrocarbons, nitrogen oxides, sulfur dioxide, ozone, and carbon dioxide. The pollution emission factors data bank enables Air Force personnel to determine the impact of Air Force installations on the surrounding environment by calculating pollution emissions from known unit operations.

49468 **APTIC NO. 72208**

Doorgeest, T.

THE PAINT INDUSTRY AND ENVIRONMENTAL PROTECTION. *(Verfindustrie en milieubescherming). Text in Dutch. Chem. Tech. (Amsterdam), 29(11):311-314, 1974.*

General problems of environmental protection in the paint industry and related legislation in different countries are outlined. The use of certain organic solvents in paints has been restricted in certain countries due to their possible interaction with nitrogen oxides in the air under the influence of ultraviolet radiation, thereby forming highly irritative compounds as are present in photochemical smog. The solvent loss in the Netherlands is estimated at some 1000 tons yearly. The inhalation of trichloroethylene or tetrachloroethylene in combination with alcohol consumption may be hazardous due to synergism.

49469 **APTIC NO. 71612**

Egger, A. M. and E. Widmer

ENVIRONMENTAL PROTECTION MEASURES IN PETROCHEMICAL PLANT AS EXEMPLIFIED BY THE GASOLINE CRACKING PLANT OF LONZA AG. *(Umweltschutzmassnahmen in einem petrochemischen Betrieb am Beispiel der Benzinspaltanlage der Lonza AG). Text in German. Chimia, 28(11):674-678, 1974.*

Environmental protection measures taken at the Visp gasoline cracking plant of Lonza AG are described. The gasoline cracking plant, using light-weight gasoline as a raw product, produces acetylene, ethylene, and hydrogen by high-temperature pyrolysis, as well as carbon dioxide, carbon monoxide, methane, ethane, saturated and unsaturated hydrocarbons with 3 to 10 carbon atoms, and higher-molecular paraffins and aromatics as by-products. Environmental concerns have led to the recirculation and recovery of most by-products, and to optimal waste heat utilization. The hydrocarbon emission amounts to 3 kg carbon/hr. Unburned cracking gases and emergency-released gases are burnt off in start-up and permanent high torches in which soot-free incineration is achieved by the use of a steam nozzle. Stripping and other gases are utilized in boilers. Nuisances due to malodorous hydrogen sulfide, mercaptans, and sulfur oxysulfide emissions are abated by adsorption on activated carbon. Ammonia emissions in the form of ammonium carbonate aerosols are abated by intensified cooling, and a demister in the preliminary stage of the washer by 90% to 1 kg/hr.

49470 **APTIC NO. 72344**

Fusamura, Nobuo

STUDY OF DUST DISCHARGE COEFFICIENT. *(Funjin haishutsu keisu no kenkyu). Text in Japanese. Kotsuzai Shigen (Frame Material), 6(23):39-46, 1974. 4 refs.*

The amount of dust discharged from a macadam plant was measured, and the dust discharge coefficients per production capacity and per horsepower were calculated. Certain correlations were found between dust concentration and wind velocity. However, only the dispersion of dust is affected by wind velocity and the amount discharged is essentially unaffected. The dust concentration measured corresponds to the amount of dust discharged rather than that produced by the macadam processing. At four macadam plants, amounts of dust discharged from various equipments were measured by sampling the exhaust duct or at certain locations in the leeward taking the distance and wind velocity into consideration. The dust discharge coefficient was obtained by dividing the amount of dust discharged by average production capacity. The amount of dust discharged per horsepower per unit time was also calculated. The relationship of dust discharge coefficient to dust concentration, wetness of rocks, type of crusher, and production capacity are also discussed.

49471 **APTIC NO. 69594**

Gagan, Earl W.

AIR POLLUTION EMISSIONS AND CONTROL TECHNOLOGY. CEMENT INDUSTRY. *Environmental Protection Service, Ottawa (Ontario), Mining, Minerals, and Metallurgical Div., Economic and Technical Review Rept. EPS 3-AP-74-3, 56p., April 1974. 33 refs.*

A study was initiated to evaluate the present and future contributions to air pollution by the Canadian cement industry and to define the best practicable technology to control these air pollution emissions. Questionnaires were sent to the cement industry and literature and governmental sources were searched for information. Actual atmospheric emissions of particulate matter from the production of cement in Canada during 1970 were 170,544 tons; estimated emissions for 1975 are 89.927 tons. Cement manufacture, a heavy industry associated with all major construction projects, is directly geared to the industrial growth of the Canadian economy. Previously, many cement plants were established close to the expected markets provided by large urban areas. With subsequent urban development, these plants often became incorporated into industrial or residential communities. This situation prompted these plants to strive to reduce particulate emissions to acceptable levels. Their efforts demonstrated that application of the best practicable technology will result in excellent control of emissions sufficient to satisfy regulatory limits established or being considered by government agencies. Background information is given for use in establishing National Emission Guidelines, as set forth in Section 8 of the Clean Air Act, for the Canadian cement industry. Increase in production planned for 1975 amount to 61% of the total clinker produced by the industry in 1970. To achieve this aim, inefficient plants in urban areas will be replaced by new facilities elewhere, and operation of other plants will be upgraded at increased capacities. New improvements in process and pollution control will result in reduced emissions of particulate matter. Installation of pollution control equipment scheduled by the cement industry for 1975 will reduce its particulate emissions in Canada to a small fraction of the total now emitted by heavy industries. (Author abstract)

49472 **APTIC NO. 75081**

Hamil, H. F. and R. E. Thomas

COLLABORATIVE STUDY OF METHOD FOR DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE IN CONJUNCTION WITH EPA METHOD 5. *Southwest Research Inst., San Antonio, Tex., Environmental Protection Agency Contract 68-02-0626, SRI Proj. 01-3462-008, Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-74-033, 42p., Sept. 1974. 12 refs.*

NTIS: PB 240342/AS

A collaborative study of the determination of stack gas velocity and volumetric flow rate (Environmental Protection Agency Method 2) as used with EPA Method 5 (Particulates) was performed. The determinations were calculated from data obtained from tests performed at three sites: a Portland cement plant, a coal-fired power plant, and a municipal incinerator. Statistical analysis of the data revealed the standard deviations for both velocity and flow rate to be proportional to the mean value. The between- laboratory standard deviations were estimated at 5.0% of the mean and 5.6% of the mean for velocity and volumetric flow rate, respectively. Using the volumetric flow rate to calculate the emission rate for compliance testing, the precision of the emission rate was primarily a function of the precision of the pollutant test method used. Thus, the volumetric flow rate determination is sufficiently precise as it appears in Method 2.

49473 **APTIC NO. 75080**

Hedley, W. H., S. M. Mehta, and P. L. Sherman

DETERMINATION OF HAZARDOUS ELEMENTS IN SMELTER-PRODUCED SULFURIC ACID (FINAL REPORT). *Mosanto Research Corp., Ohio, Dayton Lab., Environmental Protection Agency Contract 68-02-0226, Program Element 1AB013, Task 8, ROAP 21ADE-021, Rept. EPA-650/2-74-131, MRC-DA-419, 55p., Dec. 1974. 15 refs.*

NTIS: PB 240343/AS

Results from analyses of potentially hazardous impurities (trace elements) in sulfuric acid produced by non-ferrous smelters are presented. Sulfuric acid samples were obtained from acid plants attached to copper, lead, and zinc smelters. Results of analyses provided by some smelters are also included. Trace elements subjected to qualitative and quantitative determinations included: lead, copper, zinc, mercury, arsenic, cadmium, selenium, antimony, and beryllium. Annual outputs of total trace metals ranged from 44,000 to 210,000 lb/yr. The majority of the non- ferrous smelter-produced sulfuric acid is used in fertilizer and ore processing.

49474 **APTIC NO. 71691**

Henning, Kurt

EFFECT OF SULPHIDITY LEVELS ON TRS AND SO2 EMISSIONS: A CLARIFICATION. *Paper Trade J., 158(43):30-31, Oct. 28, 1974.*

Data on liquor sulfidity versus emissions of sulfur dioxide and total reduced sulfur compounds are presented from two years of measurements (daily average values) on a kraft recovery boiler. Preliminary results showed that average total reduced sulfur compounds rose from 7.1 to 16.9 ppm as the liquor sulfidity increased from 26.1 to 33.0%. Average sulfur dioxide levels rose from 32-198 ppm over the same sulfidity range. A more detailed analysis of total reduced sulfur and SO2 levels over various sulfidity ranges indicated that over a sulfidity range of 26-31%, approximately 89% of the daily average total reduced sulfur values were below 17.5 ppm. About 82% of the daily average SO2 data over a sulfidity range of 26-28% fell below 100 ppm. For the normal sulfidity range of 28-31%, 67% of the SO2 values fell below 100 ppm.

49475 **APTIC NO. 71790**

Herman, Istvanne

PROBLEMS OF ENVIRONMENTAL PROTECTION AT THE KOMARON COUNTY PETROLEUM REFINING PLANTS. *(A kornyezetvedelem kerdesei a Komarom megyei koolajipari vallalatnal). Text in Hungarian. Tatabanyai Szenbanyak Muszaki-Kozgazdasagi Kozl., 14(2-3): 97-101, April-Sept. 1974. 17 refs.*

Air and water pollution problems at the Komaron county petroleum refining plants in Hungary are described. Propane-butane gas, diesel fuel, and gasoline are desulfurized, and the gases obtained in these processes are recovered by sulfuric acid production. Hydrocarbons, sulfur dioxide, hydrogen sulfide, and soot are emitted from the closed-cycle technological process during stripping operations and technical accidents. Most of the SO2 emission is due to boilers, furnaces, and blow torches burning sulfurous fuel. The SO2 concentrations around the refineries are below the maximum allowable value. Suspended dust emitted by the refineries contains 20% soot, as well as alumina, iron oxides, and silica. To prevent dust emissions, powdered materials are handled with exhaust systems. Reduction of the lead content in gasoline would lead to increased valve wear, and increased emission of aromatic polycyclic hydrocarbons.

49476 **APTIC NO. 71712**

Hiba, Akio

SAFETY DEVICE AND SAFETY MANAGEMENT FOR GAS COMBUSTION FACILITY, PART 4. *(Gasu nensho setsubi no anzen sochi to anzen kanri, sono 4). Text in Japanese. Nihon Gasu Kyokai shi (J. Japan. Gas Assoc.), 27(11):14-25, Nov. 1974. 9 refs.*

Safe operation of gas combustion facilities is considered. To prevent explosions in such facilities, a cutting of the fuel gas supply is necessary within 4 sec after the supporting air flow is accidentally stopped. Any fuel supply shutters must be reliable and have a system that interlocks with other explosive conditions, such as vapor pressure and water level in boilers and electric power failure. Incorrect connection of electrical terminals to a magnetic shutter causes malfunction of the shutter, thus causing possible explosions of combustion facilities. The connection must be secured correctly and grounded tightly. The wires used in interlocking systems must be heat resistant. An optimum arrangement of operational cocks on combustion facilities is also recommended, which allows a systematic firing of facilities and allows easy supervision of any operational failures.

49477 **APTIC NO. 71954**

Holdeman, James D.

EMISSION CALIBRATION OF A J-58 AFTERBURNER TURBOJET ENGINE AT SIMULATED SUPERSONIC STRATOSPHERIC FLIGHT CONDITIONS. *NASA Tech. Memo., 1974:1-13, 1974. 9 refs. (Presented at American Meteorological Society and the American Institute of Aeronautics and Astronautics, 2nd International Conference on the Environmental Impact of Aerospace Operations in the High Atmosphere, San Diego, Calif., July 8-10, 1974, Paper NASA TM X-71571.)*

NTIS: N74-29215

Nitrogen oxide, hydrocarbon, and carbon monoxide emissions from a J-58 afterburning turbojet engine at simulated flight conditions of Mach 2.0, 2.4, and 2.8 (19.8 km altitude) were measured with single point tranversing gas sample probe situated 7 cm downstream of the engine primary nozzle. Measurements were made for four engine power levels, from maximum power without afterburning through maximum afterburning. Nitrogen oxides linearly increased by slightly more than a factor of two from Mach 2.0 to 2.8. The NOx emission indices (g NO2/kg fuel) in the afterburning modes were approximately 45% of the value at militaty power for the same flight speed. Hydrocarbon emissions in the afterburning mode (10-10,000 ppm carbon) were substantially higher than at military power. Peak concentrations of hydrocarbons in the center region of the exhaust and the radial extent of this region decreased with increasing flight speed and increasing power level. At military power hydrocarbon emission indices (g CH2/kg fuel) were less than 0.3 for all flight speeds. The carbon monoxide emission index at military power for Mach 2.0 was about 2.5 g CO/kg fuel and decreased with increasing flight speed. Carbon monoxide emissions in the afterburning modes were substantially higher than at military power for all flight speeds. The CO levels and the regions of highest CO emissions were very dependent on afterburning power level as well as flight speed.

49478 **APTIC NO. 72118**

Inui, Y. and H. Yoneda

INVESTIGATION OF NOX AND OTHER POLLUTANTS EMITTED FROM STATIONARY SOURCES, I: BOILERS. *(Kotei hasseigen kara hassei suru chisso sankabutsu nado osen bushtsu chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution) 9(2):406, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 257.)*

The emissions of nitrogen oxides, carbon monoxide, hydrocarbons, and aldehydes from generator boilers and industrial boilers were measured in Osaka prefecture. The emission control measures of two-stage combustion, exhaust gas recirculation, and utilization of low NOx burners are utilized in most cases. The average NOx concentrations (ppm) using various types of fuels were 108-165 for a generator boiler, 101-313 for a large industrial boiler, 96-179 for a medium boiler, and 79-168 for small boiler. The NOx concentration generally decreased with the decrease in load regardless of boiler size. The NOx concentration varied with fuel type, being lower with kerosene and gas and higher with heavy oil. The CO concentration was in the range of 0-50 ppm at stable combustion conditions; however, it increased to 2000 ppm during unstable combustion. The HC were in the range of 0-1.0 ppm at stable combustion and increased in unstable combustion. No specific correlations was found between CO and HC. No aledhyde was detected in most cases. The aldehyde concentration measured in one case was less than 1.0 ppm.

49479 **APTIC NO. 72100**

Iwasaki, S. and R. Tarui

INVESTIGATION OF NOX AND OTHER POLLUTANTS EMITTED FROM STATIONARY SOURCES V: GLASS MELTING FURNACE. *(Kotei hasseigen kara hasseisuru chisso sanka-butu nado osen bushitsu chosa (V). Garasu yokairo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):410, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 261.)*

The nitrogen oxides emissions from a glass melting furnace were measured under normal operational conditions and at a given set of conditions for the purpose of formulating NOx control plans for normal and emergency conditions of photochemical smog formation. The hydrocarbons, carbon monoxide, and oxygen concentrations were also measured. Using five glass melting furnaces with 115-200 tons/day capacity and 1075-1727 l/hr capacity burner, measurements were made with a variable air ratio obtained by adjusting the damper opening. The maximum NOx concentration measured was 2110 ppm, which was markedly higher than other types of furnaces. The NOx concentration decreased markedly with a decrease in air ratio. Reduction of NOx concentration by means of damper adjustment is a possible control method at normal conditions as well as emergency situations. The CO concentration varied greatly at low air ratio, while HC concentration varied little at low air ratio.

49480 **APTIC NO. 71540**

Junge, David C.

REALISTIC COMPLIANCE TESTING OF HOGGED FUEL FIRED BOILERS. *Preprint, Air pollution Control Assoc., Pittsburgh, Pa., 7p., 1974. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 17-19, 1974. Paper 74-AP-04.)*

Recommendations for a standard method of determining particulate emissions from hogged fuel fired boilers are outlined. Suggestions for compliance testing include provisions for specially stating that the method is for sampling and evaluation of air pollutant emissions from boilers whose principle fuel is wood or wood residue. Specification of operating and testing conditions is also recommended. A modified Environmental Protection Agency Method 5 train is considered an appropriate method for particulate sampling. Methods for determining various stack gas parameters and concentrations of oxygen, carbon dioxide, and carbon monoxide for boilers with and without wet scrubbers are also recommended as essential for compliance testing.

49481 **APTIC NO. 75089**

Katari, Vishnu, Gerald Isaacs, and Timothy W. Devitt

TRACE POLLUTANT EMISSIONS FROM THE PROCESSING OF NON-METALLIC ORES (FINAL REPORT). *PEDCo Environmental Specialists, Inc., Cincinnati, Ohio, Environmental Protection Agency Contract 68-02-1321, Program Element 1AB015, Task 4, ROAP 21AUZ-02a, Rept. EPA-650/2-74-122, 277p., Nov. 1974. 99 refs.*

NTIS: PB 240117/AS

Significant sources of emissions of potentially hazardous trace pollutants from the mining and processing of non-metallic minerals are identified. Process flow diagrams identifying major processes and material flow as well as pollutant emission sources are provided for operations dealing with cement, clay (including porcelain, refractory, and brick), gypsum, lime, phosphate rock (including fertilizer), potash, boron, mica, and fluorspar. The following processes are recommended for further evaluation because of their potential for emissions of hazardous pollutants or fugitive dust: cement and lime kilns, phosphate rock mining and washing, clay mining, and wet-process as well as thermal phosphoric acid production. Pollutants identified included: fluorides, phosphoric acid mist, carbon dioxide, various metal compounds, fly ash, sulfur dioxide, sulfur trioxide, sulfates, and alkali chlorides.

49482 **APTIC NO. 72336**

Kitagawa, Yoshio, Akira Furukawa, Masatoshi Ito, Akio Sueda, and Kan Ryomi

SURVEY RESULTS OF ODOR IN CITIES OF YAMAGUCHI PREFECTURE, PART I. *(Yamaguchi-ken shotoshi ni okeru akushu chose kekka ni tsuite, dai 1-ho). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Inst. Health), vol. 1974: 81-94, 1974.*

Investigations on bad odors were conducted at various plants in 11 cities from December 1972 to February 1973. Hydrogen sulfide, methyl mercaptan, methyl sulfide, ammonia, and trimethylamine were measured by methods indicated in the Bad Odor Prevention Law and hydrocarbons were measured by gas chromatography with flame ionization detector. The odor degree was classified from insensible as 0 to strongly odorous as 5. The odor degrees ranged from 1 to 4.5, with the higher degrees at night soil treatment plants and chemical companies. Hydrogen sulfide concentration was as high as 190 ppb at a spinning mill and methyl mercaptan concentration was as high as 55 ppb at an oil and fat processing plant. Hydrocarbons detected ranged from acetylene and ethylene to 3-methyl pentane and n-hexane.

49483 **APTIC NO. 72392**

Krstic, M., A. Papo, and A. Jaganjac

DETERMINATION OF THE SULPHUR BALANCE IN COAL DURING COMBUSTION IN SMALL AND LARGE FUEL BEDS. *(Odredivanje bilansa sumpora sagorijevanjem uglja na malim i velikim lozistima). Text in Serbo-Croatian. Arhiv. Hig. Rada Toksikol. (Yugoslavia), 25(2):185-189, 1974. 5 refs.*

The estimate of sulfur emission known as burnt sulfur which is based on the sulfur content of coal was experimentally checked for accuracy during combustion in small and large fuel beds. Measurements of stack gas sulfur revealed that estimates based on measuring the sulfur in ash (bound sulfur) under laboratory conditions where coal is burned at up to 800 C can result in errors of up to 100%. The emission of sulfur from solid fuel beds used for central heating was measured at 90%, while the emission estimate based on burnt sulfur was about 50%. The sulfur emission from domestic stoves reached 56-88% and was alwasys greater than the expected emissions of burnt sulfur. The measured emissions depended on stove design, type of coal, and operating conditions. Thus, experimental data on sulfur balance must be taken into account in addition to information concerning burnt sulfur during emission calculations.

49484 **APTIC NO. 71622**

Kuhlmann, Albert

AN INSTRUMENT OF AREAL PLANNING. PREVENTION THROUGH EMISSION PROGNOSIS. *(Ein Instrument der Raumplanung. Vorsorge durch Emissionsprognose). Text in German. Umwelt (Duesseldorf), 4(6):30-33, 1974.*

A model for emission prognosis is described. It comprises a process data bank containing information on production processes. This includes functional relationships between processes, the products and the emitted substances and particularly a representation of the quantitative relationships. In a product data bank all time series concerning development of production are stored. The time series concerning production quantities can be optionally referred to a production branch or to a region. The program for the prognosis of production developments is of modular structure. The results of the time series extrapolation can be printed out numerically and graphically. The results concerning production development yield, in connection with the reference quantities for products supplied by the process data bank, the production coefficients which in turn yield, together with the reference quantities for the emissions, the desired prognosed time series for the emissions. For better understanding of the model an example of an emission prognosis for petrochemical industry in the area of Cologne is given.

49485 **APTIC NO. 72188**

Matsushita, H., K. Arashidani, M. Nakazawa, Y. Saiki, and S. Miyazaki

ANALYSIS OF CARCINOGENIC AROMATIC HYDROCARBONS AND GASEOUS POLLUTANTS IN AUTO-EXHAUST GAS. *(Jidosha haigasuchu no hatsugansei tankasuiso nodo no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):600, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 447.)*

Compounds present in automobile exhaust under laboratory conditions were measured, using a Nissan Cedric Van (1980 cc). Concentrations of carbon monoxide, hydrocarbons, nitrogen oxides, carbon dioxide, and PAH (polynuclear aromatic hydrocarbons) were determined under idling conditions. Carcinogenic hydrocarbons sublimate readily, and could not be trapped directly with glass fiber filter paper. Exhaust gas had to be passed through an Allen condenser cooled with water at nearly 0 C, and then passed through an impinger immersed in ice water. Dust particles were caught on filter paper; filter paper and aqueous solutions of trapped material were analyzed together, with good reproducibility (concentration of benzo(a)pyrene, 0.2-0.3 micrograms/cu m). Concentrations of PAH increased with increases in CO and HC, and with decreases in NOx and CO2. Aromatic compounds analyzed included pyrene, fluoranthene, chrysene, benz(a)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, and benzo(ghi)perylene.

49486 **APTIC NO. 72272**

Miller, C. W. and T. M. Shafik

CONCENTRATIONS OF PROPOXUR IN AIR FOLLOWING REPEATED INDOOR APPLICATIONS. *Bull. World Health Organ. (Geneva), 51(1):41-44, 1974. 9 refs.*

The fumigant properties of the insecticide propoxur, an alternative to DDT for malaria control, were investigated. The insecticide was applied as two non-overlapping bands, approximately 1 m wide to the interior of houses in El Salvador once every 35 days for a period of 9 mo. Air samples were collected from the building interiors every seventh day during the entire period. The volatilization of propoxur, as determined by the amount released to the air, was most influenced by the amount of moisture present in the air, with higher air concentrations being measured during periods of high humidity. Airborne concentrations ranged from a maximum of 7 nanograms/l during dry weather to 34 nanograms/l during the rainy season.

49487 **APTIC NO. 71835**

Niwa, Takashi, Tomokuni Hayakawa, Katsuhiro Ono, and Kaichi Fujiyoshi

DISTRIBUTION OF AUTO EXHAUST GAS POLLUTION IN TUNNEL (PART 2). *Tonneru nai no jidosha haiki gasu ni yoru osen bunpu jotai ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):495, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 341.)*

A new highway tunnel was constructed alongside of the old Uguisudani tunnel, and each tunnel is now used for one-way traffic. The distribution of carbon monoxide concentration in the tunnels was investigated on Jan. 18, 1974. The CO concentration of samples collected at the center and 50 m from the entrance and exit of the tunnel was measured by non-dispersive infrared analyzer. The average CO concentrations were 5.7-19.5 ppm for the old tunnel and 9.6-32.4 ppm for the new tunnel, and the generally higher CO concentration in the new tunnel was attributable to smaller cross-sectional area (22 sq m compared to 35 sq m for the old tunnel). The correlation coefficient between traffic volume and CO concentration was 0.845-0.912 for the old tunnel and 0.659-0.916 for the new tunnel. The hydrocarbon concentration showed a similarly high correlation coefficient of 0.628-0.92. Therefore, pollution in tunnels can be estimated based on traffic volume. During a traffic tie-up, the CO concentration in the new tunnel reached to 143 ppm; however, the incidence of extremely high CO concentration (such as 1000 ppm measured in the old tunnel before the construction of new tunnel) was eliminated by the use of two tunnels.

49488 **APTIC NO. 72096**

Noki, S. and T. Mizoguchi

NOX EMISSION FROM STATIONARY SOURCES. (I) EMISSION FACTORS OF SMALL SCALE FURNACE. *(Kotei hasseigen kara hassei suru chisso sankabutsu ni tsuite. (I) Kogata nensho-ro no emisshion fakuta ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):411, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Paper 262.)*

The nitrogen oxides emissions from stationary sources were surveyed in Osaka Prefecture. The NOx concentrations emitted from various types of facilities were measured by varying the fuel type and load using chemiluminescence and non-dispersive infrared NOx analyzers. The average NOx concentration (ppm) were 73-313 for boilers, 100-176 for petroleum furnaces, 423 for coke furnaces, 349 for sintering furnaces, 74-155 for dry furnaces, and 343-1082 for glass melting furnaces. The emission variable s for NOx are structural factors such as standard furnace load, burner type and combustion method, and combustion condition factors such as air ratio, preheating temperature of air and fuel, and load. The high concentrations in the case of the glass melting furnace, cupola, and electric furnace are instantaneous values or temporary high concentrations during the particular stage of processing. In some cases, the variation in air ratio was in the range of 1-3, and the variation in load ratio was 2-100%. The emission coefficient by fuel type and type of facilities can be calculated from the relationship of the emission quantity to the dry exhaust gas.

49489 **APTIC NO. 72056**

Numata, Hajime and Shigeo Takano

A CASE OF ENVIRONMENTAL POLLUTION BY COAL-TAR PITCH. *(Taru picchi seibun ni yoru kankyo osen jirei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):540, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 388.)*

Airborne dust in flue gas generated in the processing of coal-tar pitch and coal-tar treatments in carbon factories was studied in Yamanashi Prefecture. The components of the dust collected by a high volume air sampler were extracted into acetone, cyclohexane, and nitromethane, then analyzed by thin layer, column, and gas chromatography. The amounts extracted into nitromethane and acetone solvents were 14% and 46.1%, respectively, of the total dust weight. Several polynuclear aromatic compounds such as beta-methylnaphthalene, dimethylnaphthalene, phenanthrene (Ph), 2-methylanthracene (2mAN), 1-methylphenanthrene, 9-methylphenanthrene, fluoranthene (FluO), pyrene (Py), benzphenanthrene, 3,4,-benzpyrene (3,4Bp), and 9,10-dimenthylbenzanthracene (9,10dmBAn) were identified. The analyses made for one company in 1972 showed 22.7, 7.16, 133, 116, 72.3, and 171 microgram/cu m for Ph, 2mAn, Flu, Py, 3,4Bp, and 9,10dmBAn respectively, but the values decreased in 1974 after an improvement of factory operational processes for pollutant control to 0.40, 0.53, 0.70, 0.64, 0.44, and 1.29 respectively. Prior to 1972, many plants near carbon factories died during the spring; however, such accidents did not occur in 1974, indicating that flue gases discharged from carbon factories might have been responsible.

49490 **APTIC NO. 72059**

Oosaki, Katsuhiro, Akiro Seino, and Yoshiharu Sato

AIR POLLUTION PRODUCED BY STRAW BURNING. *(Warayaki ni yoru kankyo taiki no osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):544, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 392.)*

The contribution of straw burning to the areal air pollution in Tsuruoka city, Yamagata Prefecture, was analyzed in terms of nitrogen oxides, sulfur oxides, carbon monoxide, airborne particulates, and total hydrocarbon levels. Atmospheric analyses are conducted both inside and outside the city. Nitrogen oxides and airborne particulates were greatly increased. The average nitric oxide values inside and outside the city were 0.011 ppm and 0.056 ppm respectively. Both inside and outside the city, similar levels were recorded for nitrogen dioxide and airborne particulates; 0.021 ppm and 0.26 mg/cu m respectively. The nitric oxide level outside the city was five times higher than that inside the city; this is the result of oxidation of NO to NO2 during the transport of NO. The cumulative time during which the levels of NO were greater than 0.02 ppm and airborne particulates were greater than 0.1 mg/cu m were plotted against clock time. Their peaks coincided with the straw burning period, 5 pm to 9 pm.

49491 **APTIC NO. 75054**

Patterson, R. M. and F. A. Record

MONITORING AND ANALYSIS OF CARBON MONOXIDE AND TRAFFIC CHARACTERISTICS AT OAKBROOK (FINAL REPORT). *GCA Corp., Bedford, Mass., GCA/Technology Div., Office of Air and Waste Management Contract 68-02-1376, Program Element 68X010R, 512953DDD1, Task 7, Rept. EPA-450/3-74-058, GCA-TR-74-20-G, 469p., Nov. 1974. 19 refs.*

NTIS: PB 239330/AS

Traffic and ambient carbon monoxide concentrations were studied at a major at-grade signalized intersection located in the vicinity of a suburban shopping center. A procedure for estimating queue lengths and emissions at the intersection approach was developed and used to estimate the impact of the intersection on ambient CO concentrations using the Environmental Protection Agency HIWAY model. Agreement within a factory of two between calculated and observed concentrations was observed for 22 of 27 cases. Exact agreement was observed for six comparisons. The mean calculated value was 3.5 ppm versus a mean 3.8 ppm observed value. The correlation coefficient was 0.34, significant at better than the 10% level. (Author abstract modified)

49492 **APTIC NO. 72078**

Pinter, Antal

INFLUENCE OF THE EXPECTED STRUCTURAL CHANGES OF ENERGY CARRIERS ON THE AIR QUALITY IN INHABITED AREAS. *(Az energiahordozok varhato strukturalis valtozasanak hatasa telepuleseink levegotisztasagara). Text in Hungarian. Energiagazdalkodas, 15(10):453-456, Oct. 1974.*

The expected structural changes in energy carriers, and their impact on the evolution of air pollution in Hungary are outlined. The total energy consumption has increased by 51% from 1960 to 1970. The structural changes are characterized by an increase in the shares of liquid hydrocarbons and natural gas among the energy carriers at the expense of coal. Natural gas is used mainly for domestic and industrial purposes. The increasing shares of natural gas and liquid hydrocarbons at the expense of coal has led to a considerable reduction of the fly-ash and sulfur dioxide emissions. The share of natural gas is expected to reach 25% in 1980.

49493 **APTIC NO. 71621**

Plassmann, Eberhard

EXHAUST GAS EMISSION FACTORS FOR THE SECTOR AUTOMOBILE TRAFFIC. THEIR IMPORTANCE FOR FEDERAL GOVERNMENT AND STATES. *(Abgas- Emissionsfaktoren fuer den Bereich des Kraftfahrzeugverkehrs. Ihre Bedeutung fuer Bund und Laender). Text in German. Staub, Reinhaltung Luft, 34(12):433-435, Dec. 1974. 14 refs.*

In the Federal Republic of Germany great efforts are underway to curtail exhaust gas emission by automobiles. An important step in this goal is the emission inventory. The city of Cologne started early to determine the average exhaust gas emission by passenger cars and trucks in dependence on the driving cycles. An important parameter characterizing the traffic situation is the average speed. Simulation of the driving cycle on a test stand revealed a strong dependence of the exhaust gas emission on the average driving speed, so that automobile emission factors determined with the aid of the annual gasoline consumption, the annual automobile operation time, or the covered distances are inaccurate. For better results the emission factors should be obtained only on vehicles which have been in use for some time and under consideration of the traffic situation and the speed. The importance of emission factors for dispersion models is stressed.

49494 **APTIC NO. 71980**

Ross, F. F.

THE RESPONSIBILITIES OF LARGE INDUSTRY. *Loughborough Univ. of Technology (England), Leverhulme Project, Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-9. (Jan. 7-8.)*

The responsibilities of the British electrical industry regarding air pollution control are discussed. Emphasis is placed on research into the overall effects of such pollutants as sulfur dioxide, carbon dioxide, and nitrogen oxides. The beneficial effects of SO2 with respect to supplying plants with sulfate is cited as an example of the industry s responsibility to avoid unnecessary expenditures for stack gas treatment and to pursue research which leads to an accurate assessment of the effects of man-made pollutants. Nitrogen oxides are not a serious problem; these pollutants are currently minimized by controlling combustion for minimum sulfur trioxide formation. The beneficial effects of carbon dioxide to plants are balanced against the pollutant s effect on air temperature and marine life in the oceans. Responsibilities of the industry with regard to CO2 production include checking calculations of trends in rising atmospheric temperature and increased oceanic CO2 absorption along with studies of problems associated with transferring over to nuclear power production.

49495 **APTIC NO. 72125**

Shimoda, M. and T. Oono

INVESTIGATION OF NOX AND OTHER POLLUTANTS EMITTED FROM STATIONARY SOURCES, IV: ELECTRIC ORE FURNACE. *(Kotei hasseigen kara hassei suru chisso sanka-butsu nado osen bushitsu chosa. (IV) Denkiro). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):409, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 260.)*

The emission of nitrogen oxides, total hydrocarbons dust, and hydrogen fluoride from electric ore furnaces was measured. In the case of small scale electric ore furnaces (less than 10 tons/ch), the NOx concentration was less than 2-10 ppm, total emission quantity was less than 0.1 N cu m/hr, and eF was about 0.096 kg/ton. As for the medium scale furnace (10-30 tons/ch), the NOX concentration increased to 200-300 ppm instantaneously at arcing; however, the average concentration was several ppm, total emission quanity was 0.2-0.3 N cu m/hr, and eF was about 0.033 kg/ton. In the case of large scale furnaces (over 30 tons/ch), the occurrence frequency of instantaneous high NOx concentration (400 ppm) was increased. The average concentration was less than 20 ppm, total emission quantity was 0.7-1.7 N cu m/hr, and eF was about 0.016 kg/ton. The inlet dust concentration was as high as 14-0.4 kg/N cu m, but can be treated effectively by the use of a local hood or direct suction dust collector. The eF was about 2.1-56.9 kg/ton. The total HC emission increased instantaneously at ignition. The averate concentration was 2-3 ppm, and eF was about 0.004 kg/ton. The HF measured after the addition of fluorspar showed no sign of HF emission. The variation in NOx dust concentration in one cycle of operation was also measured.

49496 **APTIC NO. 72123**

Szili, Geza

CURRENT SITUATION IN THE ENERGY SUPPLY IN HUNGARY, AND LONG-TERM TASKS IN ENERGY ECONOMY. *(Nepgazdasagunk energiaellatasanak helyzete, tavlati energiagazdalkodasi feladatok). Text in Hungarian. Energiagazdalkodas, 15(10):435-443, Oct. 1974.*

The current situation of energy supply in Hungary and long-term tasks in energy economy are described. While the proportion of solid energy carriers has been reduced in favor of hydrocarbons, including natural gas, during the last few years, the recent energy crisis has forced a revision of this energy policy, and has lead to an increase in the use of coal, to limitations on the industrial and domestic uses of hydrocarbons and to price increases of 33-75% for liquid hydrocarbons, and of 15% for coal. Some 94 to 95% of all imported energy carriers (40%) come from eastern block countries, escpecially from the USSR, and the rest from capitalist markets. Fuel oil export has been increased in the wake of the energy shortage. The share of electricity is expected to reach 50% within the next 15 yr. Along with coal-based power plants, the first nuclear power plant is under construction.

49497 **APTIC NO. 72074**

Toth, Tamas and Janos Nagy

ELECTRON MICROSCOPIC STUDY OF THE GRANULOMETRIC DISTRIBUTION OF DUST SAMPLES FROM OXYGEN CONVERTER FLUE GASES. *(Az oxigenes Martin-acelgyartas fustgazabol szarmazo pormintak szemncsenagysag- eloszlasanak elektronmikroszkopos vizsgalata). Text in Hungarian. Banyasz. Kohasz. Lapok - Kohaszat, 107(11):508-512, 1974. 9 refs.*

The effect of oxygen blowing on the granulometric distribution and composition of dust particles in oxygen-blown open-hearth furnace flue gases was studied by comparing dust samples collected during and between blowings. The iron content of the dust collected during blowing was 60.4% against 52.8% in samples collected during intervals between blowings. The smallest particles were within a size range of 0.0125-0.0375 micron with a mean value of 0.025 micron. The largest particles were within a range of 1.0625-1.1125 micron with a mean value of 1.0875 micron. The samples collected during blowing contained a fraction accounting for 94.4% between 0.0125 and 0.4125 micron, while this fraction accounted for 95.1% in the samples collected between blowings, which indicates a negligible difference. The arithmetical mean of the grain diameter and modus were higher for dust collected during blowing.

49498 **APTIC NO. 71608**

Toyosawa, S., Y. Umezawa, T. Shirai, S. Yanagisawa, T. Yukawa, and S. Nakamura

ANALYSIS OF GASEOUS PRODUCTS FROM RUBBER WEAR. *(Gomu mamo doki ni hassei suru gasu-jo bushitsu no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):200, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 57.)*

Gaseous substances produced by abrasion of rubber were analyzed by gas chromatography- mass spectrometry. Using an enclosed abrasion tester with dry air inlet and sample air outlet leading to a concentration device, gaseous samples were obtained by intermittently contacting tires with a rotating disk. About 40 g of particulate and gaseous substances were produced by one run (25 min, contact frequency every 3 sec). After removing carbon dioxide and moisture, the sample gas was concentrated using diatomaceous earth fire brick particles as sorbent while cooling with liquid oxygen. An air sample collected without running the abrasion disk was analyzed as a blank, by which lower hydrocarbons and aromatic compounds such as benzene, toluene, and xylene were identified as substances naturally emitted from rubber. In the case of the abrasion test, isoprene, carbon disulfide, cyclohexene, and methyl cyclohexene were identified besides compounds contained in the blank.

49499 **APTIC NO. 71648**

Uzhdavini, E. R.

FUELS AND CURRENT PROBLEMS OF GEOHYGIENE. *(Topliva i aktual nyye problemy geogigiyeny). Text in Russian. Khim. Tekhnol. Topl. Masel, no. 9:16-19, 1974. 13 refs.*

General ecological problems in connection with the extraction, transportation, and combustion of fuels are discussed. While the biosphere has an enormous, though not unlimited, self-purification capacity, the anthropogenic emission of certain combustion-generated pollutants (such as sulfur dioxide) may amount to the natural emission level by the end of this century. In addition, the concentration of the bulk of emissions in developed countries and industrial areas creates serious hygienic problems. Sulfur dioxide is responsible for irritation of the mucosa, chronic bronchitis, and potentiating the effect of chemical carcinogens. Removal of SO2 from flue gases and fuel desulfurization in industrialized countries will be essential. Combustion processes generate unstable carbon monoxide and carcinogenic polycyclic aromatic hydrocarbons, such as benzo(a)pyrene, for which maximum allowable concentrations of 0.01 micrograms/cu m in open air and 0.00015 mg/cu m in workplace air have been set in the USSR. Efforts are being made to replace tetrethyl lead in gasoline by less harmful manganese compounds, such as manganese cyclopentadienyl tricarbonyl.

49500 **APTIC NO. 72033**

Yoshida, Koichi

A TENDENCY IN NITROGEN OXIDES DISCHARGED FROM VEHICLES. *(Jidosha haigasu-chu no chisso sankabutsu no haishutsu keiko). Text in Japanese. Seikatsu to Kankyo (Life Environ.), 19(11): 33-39, Nov. 1974.*

Since the amount of gas discharged varies widely with different vehicles, there are great differences among vehicles in the amount of nitrogen oxides discharged. The relationship between total gas discharged and nitric oxide discharged by different vehicles is given as an example. Vehicles with higher gas discharge and higher mean discharge concentration discharge larger amounts of NO. Emission standards for vehicles should take this relationship into account. There is a linear relationship between mean discharge concentration and either wt% NOx or discharge coefficient.

49501 **APTIC NO. 70040**

U. S./USSR Working Group On Stationary Source Air Pollution Control Technology

DEVELOPMENT OF METHODOLOGY AND ESTABLISHMENT OF EFFICIENCY OF INDUSTRIAL DUST COLLECTION EQUIPMENT FOR FINE PARTICULATE. *U. S./USSR Environmental Agreement, Proj. A-4, Task 1, 295p., Sept. 1974. 40 refs. (Translated from Russian. (Individual reports contained in TR 104-75 processed under APTIC 75267-75292.)*

A compilation of 26 papers covering the measurement and collection of industrial dust emissions is presented. Specific topics include: modifications of dust collection devices (e.g., cyclones and electrostatic precipitators) for increasing collection efficiency; the determination of dust characteristics (wettability, particle size, resistivity, stickiness); and various sampling and monitoring devices for the in-situ measurement of dust and stack gas parameters. Field test results from studies involving the above areas are also presented.

49502 **APTIC NO. 71601**

LEAD POISONING, A PREDOMINANTLY ENVIRONMENTAL PROBLEM. *(Loodvergiftiging vooral een kwestie van milieu). Text in Dutch. Chem. Weekblad, no. 1974:9-10, 1974. 10 refs.*

Problems of chronic lead poisoning due to automotive exhaust lead and lead in paints are described. Exhaust gas and street dust are the main sources of inhaled lead. City air contains 1 to 4 micrograms lead per cu m. A tetraethyl lead concentration of 0.1-1 micrograms/cu m was measured in Stockholm. Automotive exhaust gases contain 1000-5000 micrograms tetraethyl lead per cu m following cold start, 50-1000 micrograms/cu m after hot start, and 5-100 micrograms/cu m during cruising. The significantly increased blood lead levels in urban children are due primarily to the ingestion of lead-containing paint and paper and to inhalation of automotive exhaust lead.

49503 **APTIC NO. 71799**

Kumamoto City Public Health Agency (Japan), Dept. of Health, Pollution Control Division

REPORT OF POLLUTION INVESTIGATIONS IN KUMAMOTO CITY (REPORT NO. 8). *(Kumamoto-shi ni okeru kogai chosa hokoku (Dai-8-ho)). Text in Japanese. 211p., July 1974.*

This report is a collection of data for Kumamoto City, Kyushu, Japan, for 1973, concerning pollution levels, sources, complaints, countermeasures, regulations, and meteorological and geographical observations. Types of pollution included in the report are atmospheric (meteorological aspects, dust, sulfur oxides, carbon monoxide, nitrogen oxides, photochemical oxidants, hydrocarbons, lead); noise (including automobile and airplane noises); water (including mercury contamination); and malodor.

49504 **APTIC NO. 72138**

Japan Environmental Agency

NEW DEVELOPMENTS IN ENVIRONMENTAL PROBLEMS. *In: Quality of the Environment in Japan. p. 25-57, 1974.*

The relationship between environmental policy and the petroleum situation in Japan is discussed. Air pollution caused by particles of dust and soot improved with increased usage of petroleum, while pollution by sulfur oxides and carbon monoxide worsened. The most serious pollutants are nitrogen oxides, hydrocarbons, and oxidants. The influence on environmental conservation caused by the reduction in crude oil imports due to the oil crisis is illustrated. By causing a reduction in absolute volumes of secondary product manufacture, distribution, and consumption, the reduction in crude oil supply reduces the volume of pollutants. This oil reduction also reduces high quality fuels low in sulfur, and may also increase pollution. Basic directives for an environmental policy were developed and include: compliance with automobile exhaust standards (in spite of increased fuel use), energy saving measures, and development of energy sources within Japan. Environmental problems which will be associated with increased development are discussed for industrial development and high speed transportation.

1973

49505 **APTIC NO. 75057**

Bach, W. D., B. W. Crissman, C. E. Decker, J. W. Minear, P. P. Rasberry, and J. B. Tommerdahl

CARBON MONOXIDE MEASUREMENTS IN THE VICINITY OF SPORTS STADIUMS (FINAL REPORT). *Research Triangle Inst., Research Triangle Park, N. C., Office of Air and Waste Management Contract 68-02-1096, Program Element 2AC 129, Task 1, Rept. EPA-450/3-74-049, 98p., July 1973. 3 refs.*

Monitoring studies of ambient carbon monoxide concentrations in the vicinity of major league baseball stadiums in Pittsburgh and Atlanta were conducted for approximately 1 week in each location. Wind speed and direction were also recorded, and traffic was monitored for 1-hour periods before and after games. Grab samples of CO were also obtained during the 1-hour pre- and post-game periods. National Ambient Air Quality Standards were not exceeded for either 8-hour or 1-hour averaging periods. Post- game traffic strongly affected the ambient CO concentrations in the stadium vicinity, while pregame traffic exhibited little influence on ambient CO since the traffic in the latter case was spread over a period of several hours. The combination of meteorological parameters and topography of the stadium complex are exerted the major influence on the distribution of CO about the complex. Grab samples did not add significant information to that obtained from continuous monitoring.

49506 **APTIC NO. 69606**

Neti, R. M. and George S. Turner

ATMOSPHERIC PRESSURE-OPERATED NO-O3 CHEMILUMINESCENCE ANALYZER FOR AUTO EXHAUST APPLICATONS. *Preprint, Instrument Society of America, Pittsburgh, Pa., 8p., 1973. 8 refs. (Presented at the Instrument Society of America International Conference and Exhibit Houston, Tex., Oct. 15-18, 1973, Paper 73-715.)*

An atmospheric pressure-operated instrument for the measurement of nitrogen oxides from automobile exhaust is described. The method is based on the chemiluminescent reaction between nitric oxide and ozone. The device has a linear range from 0.1-10,000 ppm NOx, and by adjusting the sample and ozone flow rates it is possible to extend the range of the instrument both on the low and high ends of the concentration range. Nitrogen dioxide is determined after thermal conversion (400 C) over a catalyst to nitric oxide. Conversion is independent of the composition of the carrier gas and is very close to 100%. Typical ammonia interference is less than 2%. Under correct operating conditions, carbon monoxide and carbon dioxide have negligible influence either on the NO2 conversion or on the efficiency of the reaction. The instrument is designed for either computer or manual operation. (Author abstract modified)

49507 **APTIC NO. 71963**

Taylor, F. M. H., J. R. Kell, L. O Connell, R. E. Tully, and L. A. Johnson

CONSERVATION AND CLEAN AIR: A STUDY OF ATMOSPHERIC POLLUTION IN GREAT BRITAIN. *Institution of Heating and Ventilating Engineers, London (England), 39p., 1973. 20 refs.*

Industrial, non-industrial, and vehicular atmospheric emissions in Great Britain are surveyed, with particular emphasis on pollution from fossil fuel combustion. Great Britain currently emits on an annual basis 620 million tons of carbon dioxide, 16 million tons of carbon monoxide, 6 million tons of sulfur dioxide plus hydrogen sulfide (measured as equivalent SO2), and 2 million tons of nitric oxide plus nitrogen dioxide as compared to worldwide anthropogenic emissions (millions of tons/yr) of 17,000, 210, 120, and 40, respectively. Progress in the abatement of smoke, grit and dust, fumes, SO2, CO, hydrocarbons, aldehydes, nitrogen oxides, and odors is outlined for the period 1955-1972, with the most significant reductions being observed in the area of smoke control. Smoke reductions in the London area over the study period amount to 85%, with reductions for the country as a whole being 60%. Sulfur dioxide emissions from medium- and low-level dispersion sources (domestic heating, small industries, and diesel vehicles) appear to be reduced by about 50%, though SO2 emissions from power stations stations and large factories show a 200% increase over the 1955-1972 period. Emissions of CO, hydrocarbons, aldehydes, and NOx (motor vehicles and fossil-fuel fired boilers) appear to be increasing, though pollution from these sources is not excessive. Odor emissions appear to be gradually lessening. Recommendations for further reduction in air pollution include: the use of suitably located tall stacks, the burning of low-sulfur fuels in congested urban areas, structural insulation improvements, and various monitoring, enforcement, and taxation policies.

49508 **APTIC NO. 72007**

Commonwealth Edison Co., Chicago, Ill.

PROVIDE THE ESTIMATED QUANTITY AND LIST THE NOXIOUS NON- RADIOACTIVE, GASEOUS EFFLUENTS FROM THE PLANT DUE TO THE OPERATION OF THE OIL FIRED HEATING BOILERS, DIESEL-GENERATORS, ETC. *In: Supplement IV to the Environmental Report for Dresden Units 2 and 3, AEC Docket Nos. 50-237 and 50-249. 3p., Jan. 15, 1973.*

NTIS: DKT 50237293

Yearly, maximum hourly, and average hourly emission rates are tabulated for the oil-fired equipment at Dresden Units 2 and 3 of Commonwealth Edison. The average hourly emissions, calculated for typical January conditions, from the process and space heat boiler amount to 3.6 lb/hr particulates, 21.9 lb/hr sulfur dioxide, 9.3 lb/hr nitrogen oxides, and 0.03 lb/hr carbon monoxide. The average hourly emissions from three diesel generators are respectively: 2.7 lb/hr particulates, 8.9 lb/hr SO2, 15.6 lb/hr NOx, and 14.6 lb/hr CO.

1972

49509 **APTIC NO. 71879**

Kandahl, Prithvi S.

AIR POLLUTION - THE CASE FOR CHANGE OVER TO EMULSIONS FROM CUTBACKS. *Pa. Assoc. Asphalt Tar Appl. News, 1(5):1-5, June 15, 1972. 7 refs.*

Advantages of using asphalt emulsions in place of asphalt cutbacks for applying asphalt road surfaces are reviewed in terms of reducing air pollution. Asphalt cutbacks which are manufactured by blending asphalt cement with petroleum solvents (naphtha or kerosene) contain definite amounts of aromatics and other reactive hydrocarbons and pose an air pollution problem upon evaporation. The quantity of diluents intended for evaporation into the atmosphere when one mile of road (12 ft wide) is constructed using these cutbacks can be as much as 17 tons. Asphalt emulsions (mixtures of asphalt and water) are therefore a desirable alternative since only water evaporates into the atmosphere when the emulsions set.

49510 **APTIC NO. 72003**

Schlichting, Harold E., Jr., R. Malcolm Brown, Jr., and Paul E. Smith

AIRBORNE ALGAE OF HAWAII: A MODEL FOR COORDINATED AEROBIOLOGICAL RESEARCH. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. II, Dev., Demonstr., Eval. Models, Boulder, Colo., 1972, p. 150-155, 1973, AP-USIBP-H-73-3. (July 12-14.)*

An outline of proposed studies dealing with airborne algae in Hawaii is presented. The studies will focus on: the effects of air pollutants and meteorological conditions on airborne algae and protozoa, the atmospheric transport of algae in Hawaii, and algae as the cause of human allergies. Litton and sequential samplers will be used to collect the algae for determining the species and numbers of algae in the atmosphere under known specific environmental conditions. Known volumes of air are to be monitored continuously for meteorological conditions and selected air pollutants using a Westinghouse data logging system and a Westinghouse computer service for data analysis. Electron microscopy is going to be used to study the cytological changes of the airborne algae. Data from 1972 North Carolina, Hawaii, and Ohio studies will serve to establish procedures for 1973 Hawaii research and for correlation with 1974 Hawaii data.

1971

49511 **APTIC NO. 71895**

Brandham, P. T. and W. Lowe

CONTROL AND RATING OF MEDIUM SPEED TURBOCHARGED GASEOUS FUEL ENGINES. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-34. 2 refs.*

The development of a dual fuel (gas and liquid) engine based on a previously developed diesel type is described along with the development of its spark ignition counterpart. Particular emphasis is placed on the development of a governing system capable of accurate speed control for both liquid and gaseous fuels and on the ability of the engine to change fuels under any load condition with negligible transient speed variations. The effect of adverse ambient conditions on engine rating is also examined. The use of dual fuel engines in total energy installations is reviewed, with reference being made to the advantage of the gas engine over the diesel engine in recovering exhaust heat.

49512 **APTIC NO. 71520**

Giordano, Giorgio

CONTROL SYSTEMS OF GAS TURBINE AND HELPER STEAM TURBINE UNITS. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-21.*

Control systems for combined cycle gas turbine and steam turbine plants are discussed, with particular emphasis on the heat recovery applications of such installations. Combined steam-power plants generally consist of the following components: a gas turbine, a boiler, a steam turbine, and a driven machine (electric generator, compressor, pump). Problems involving the matching of control systems for the gas turbine and steam turbine portions of such plants are reviewed, with examples given for combined electrical power generation and steam production facilities and for an air compression station in an ammonia plant.

49513 **APTIC NO. 71519**

White, A. O.

THE APPLICATION OF GAS TURBINES TO THE PROPULSION OF LIQUEFIED NATURAL GAS TANKERS. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-40. 4 refs.*

The application of dual fuel gas turbines to the propulsion of liquefied natural gas tankers is reviewed. Topics covered include: gas turbine operation, fuel nozzle or injector types (pressure atomizing nozzles, air blast nozzles, air assist nozzles, vaporizing fuel nozzles, and centrifugal atomizers), dual fuel (gaseous and liquid) systems, gas turbine control, and gas turbine installation practice. Measures for removing water and salt impurities from liquid and residual fuels to prevent corrosion of turbine power plants are also reviewed.

49514 **APTIC NO. 71993**

Subcommittee on Air and Water Pollution

PROJECT ON THE PREDICAMENT OF MANKIND. *92nd Congress (Senate), First Session, Serial 92-H17, p. 223-241, April 28 and 29, May 3, 4, 5, and 6, 1971. (Hearings before the Committee on Public Works.)*

GPO

Environmental deterioration in terms of air and water pollution is discussed in relation to time delays between a polluting activity and its ultimate consequences, geographically far ranging effects, and the practical impossibility of totally eliminating environmental problems. A simple model of dichlorodiphenyltrichloroethane (DDT) levels in the environment is used to illustrate the concept of time delay. A computer printout indicating the concentration of DDT at different points in the ecosystem (soil, water, fish) over the next 50 years is illustrated for the assumption that global DDT use is slowly going to appear off to zero by the year 2000. The model indicates that DDT concentrations in fish continue to rise for 11 yr after application decreases. In relation to geographical implifications, the ecological consequences of DDT depend little on the actual location of its initial application since its dispersion is worldwide. The central driving forces of environmental deterioration are cited as population growth and rising expectations, making the total elimination of pollution a practical impossibility.

49515 **APTIC NO. 71994**

Battelle Memorial Inst., Ohio, Columbus Labs.

ENVIRONMENTAL QUALITY. *92nd Congress (Senate), First Session, Serial 92-H17, p. 158-222, April 28 and 29, May 3, 4, 5, and 6, 1971. 49 refs. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

GPO

An exposition of available facts, opinions, and recommendations concerning major trends and problems affecting environmental quality is presented. Air, water, land, and noise pollution are considered. Air pollution from motor vehicles, power production, and various other industrial sources is examined in terms of annual emissions and existing or potential controls. The effects of such pollutants as carbon monoxide, carbon dioxide, nitrogen oxides, sulfur oxides, particulates, and hydrocarbons on the atmosphere (e.g., greenhouse effect) and on human health are reviewed. A legislative history of air pollution control is also presented. Transportation accounts for the largest source of pollution (91.3 million tons/yr) followed by fuel combustion from stationary sources (41.4 million tons/yr) according to 1966 data. Exposure to polluted air appears to be associated with the occurrence and worsening of chronic respiratory diseases such as

1927

49516 **APTIC NO. 71882**

Sowden, G.

ATMOSPHERIC POLLUTION WITH ARSENICAL DUST. *J. State Med., vol. 35:668-670, 1927.*

Samples of dust were taken from the roof, rain water gutters, and chimney shaft of an electric light works, a refuse destructor, and three factories in the same vicinity in response to a a complaint by one of the factories that dust emissions from the light works were found to contain 125 ppm arsenic upon analysis. The flue dust from the light works contained 7.0 ppm arsenic as compared to 100 ppm for the refuse destructor and 100-500 ppm for the three factories in the area. Dust samples from rain water gutters and the roof of the light works contained quantities similar to those measured at the other locations. The source of the arsenic was attributed to coal-burning furnaces used by the facilities examined. The possibility exists that workmen engaged in clearing out furnace flues are subject to toxic levels of arsenic, although the smallest fatal dose would require a quantity of flue dust in excess of 0.5 lb to yield 2 grains of arsenic from the factory using the highest flue-dust arsenic levels (500 ppm).

CONTROL METHODS

1975

49517 **APTIC NO. 72090**

Bailin, Lionel J., Merle E. Sibert, Leonard A. Jonas, and Alexis T. Bell

MICROWAVE DECOMPOSITION OF TOXIC VAPOR SIMULANTS. *Environ. Sci. Technol., 9(3):254-258, March 1975. 10 refs.*

An electrical discharge technique for the destruction of toxic gas simulants in a microwave plasma is described. Nearly 100% decomposition of dimethyl and diisopropyl methylphosphonates in helium and air is obtainable. Residence times range from 0.13-2.4 sec. The reaction products are mainly phosphoric acid on its precursor, phosphorus pentoxide, and dealkylated phosphonic acids. The method holds promise for the controlled destruction of pesticides, defoliants, and toxic chemical vapors in large volume plasma applicators. (Author abstract modified)

49518 **APTIC NO. '817**

Bergmann, Lutz

AMERICAN EXPERIENCES AND INNOVATIONS: TEXTILE FILTERS FOR HIGHER TEMPERATURE RANGES. *(Amerikanische Erfahrungen und Neuerungen: Textilfitler fuer hoehere Temperaturbereiche). Text in German. Wasser Luft Betrieb, 19(1):19-25, 1975. 14 refs.*

New textile filters, and experiences with such filters in the U. S. are surveyed. Fine dusts generated in asphalt works are separated mainly by Nomex filters designed as stationary or mobile filter units. The waste gases they handle have temperatures of up to 200 C. Material handling, smelting, milling, and casting operations in the iron and steel industry are dedusted by textile fibers or Harsell control systems using glass-fiber bag filters. Textile fibers are used primarily for electric-arc furnaces. Emissions from furnaces and clinker coolers in cement works use textile and fiberglass filters, while the carbon black industry is experimenting with Teflon filters. Textile filters are used tentatively in power plants, but power plants can be expected to become a huge market for fiber-glass filters due to the sulfur dioxide present in the flue gases. Glass-fiber filters are noted for temperature resistance to over 330 C, and high resistance to chemicals. Nomex filters withstand temperatures up to 210 C without physical changes. Especially good temperature resistance up to 300 C, and high resistance to chemicals can be achieved with Teflon filters.

49519 **APTIC NO. 72136**

Bohn, Thomas

HYDROGEN AS ENERGY CARRIER OF THE FUTURE. *(Wasserstoff als Energietraeger der Zukunft). Text in German. Umwelt (Duesseldorf), 5(2):21-22, 1975.*

The lower heating value of the liquid hydrogen is 28,896 kcal/kg, that of gasoline 10,022 kcal/kg (or 2049 kcal/l for hydrogen and 7617 kcal/l for gasoline). The transport of gaseous hydrogen in pipes is feasible with present technical knowledge, however, it is about 23% more expensive than the transport of methane. Liquid hydrogen is even more expensive because liquefaction alone costs $5/gigacal. It is easily flammable. As fuel it will be used in speical cases only, such as perhaps for jumbo jets. In industry the market for hydrogen would be large. For example, for the direct reduction of iron 30 billion cu m/a could be used and for the production of ammonia about four billion cu m/a. Recent studies have concentrated on the production of inexpensive hydrogen through thermolytic water cracking with the aid of nuclear process heat. The total activity in this field in the Federal Republic of Germany is still small with total expenditures not more than $0.33 million per annum.

49520 **APTIC NO. 71782**

Bomback, John L., Mary Anne Wheeler, Jack Tabock, and J. Daniel Janowski

DISTRIBUTION OF CONTAMINANTS IN USED AUTOMOTIVE EMISSION CATALYSTS. *Environ. Sci. Technol., 9(2):139-143, Feb. 1975.*

Electron probe analysis and scanning electron microscopy were used to determine concentrations and distributions of lead, zinc, iron, phosphorus, and sulfur in a series of used automotive emission oxidation catalysts containing platinum as the active agent. The used converters were selected from a test fleet of cars and trucks after 50,000 mi of service using low-lead fuel. Lead formed sulfate and phosphate crystals on the catalyst washcoat surface, and these crystals coalesced to form a continuous layer which smothered the catalyst and/or formed branching treelike structures which grew up several hundred micron from the washcoat surface. The fragile appearance of the crystals suggested the likelihood of the deposits occasionally breaking off and exiting through the exhaust as particulates. Lead, sulfur, and phosphorus also penetrated into the washcoat micropore network and in extreme cases completely plugged it. Iron and zinc did not penetrate into the washcoat. Lead, phosphorus, and sulfur appear to be deposited from the gas phase, whereas zinc and iron appear to be deposited as particulates. The formation of an impervious layer of lead sulfate and phosphate and the penetration into the washcoat micropore structure account for the poisoning effect which these elements have on catalytic activity. (Author abstract modified)

49521 **APTIC NO. 71766**

Butsujima, N.

AIR SUPPLY CONTROL APPARATUS FOR FUEL INJECTION ENGINE. *(Nenryo funssha engin no kuki kyokyuryo chosei sochi). Text in Japanese. (Suzuki Automobile Ind. Co., Ltd., Shizuoka (Japan)) Japan. Model Util. Sho 50-735. 2p., Jan. 10, 1975. (Appl. Aug. 13, 1969).*

A device that increases the air supply to cylinders during idling operation for fuel injection engines is described. A bypass tube is installed to connect both sides of the throttle valve of the carburetor. A valve controlled by a diaphragm closes and opens the bypassing tube. When the pressure beyond the throttle valve (cylinder side) is lower than atmospheric pressure, the diaphragm senses the pressure and opens the valve, supplying extra air to engine cylinders through the bypass tube. However, the outlet of the bypass tube is installed near the throttle valve so that extra air can flow through only when the engine is idling.

49522 **APTIC NO. 72300**

Coy, David W. and Norman W. Frisch

SPECIFYING PRECIPITATORS FOR HIGH RELIABILITY. *J. Air Pollution Control Assoc., 25(2):128-132, Feb. 1975. 5 refs.*

The design of electrostatic precipitators of high reliability is discussed. Adequate fuel analysis data are required to design a reliable precipitator system. Average and typical fuel analyses are insufficient for sizing a precipitator to reliably treat a large proportion of the fuel population. The use of a large number (greater than 30) of individual fuel samples, either for individual sizing or for the estimation of a parent population believed representative of the fuel samples, are more reliable approaches. Sufficient redundancy is required to permit sustained operation under conditions of electrical section and other failure. This redundancy is readily defined. Distribution effects, such as those representing gas velocity, gas temperature, even dust concentration, can be significant in reducing the efficiency of a precipitator designed for high efficiency. Methods for adequately conpensating for the effects are described.

49523 **APTIC NO. 71730**

Evans, Robert J.

METHODS AND COSTS OF DUST CONTROL IN STONE CRUSHING OPERATIONS. *Bureau of Mines Information Circ., no. 8669:1-21, 1975. 4 refs.*

Methods and costs of dust control are examined for three hypothetical stone crushing operations located in central Pennsylvania, operating at 300, 600, and 1000 tons/hr. Environmental Protection Agency estimates of particulate emission factors for rock handling processes indicate that a maximum of 15 lb dust can be generated for every ton of stone processed and 1.7 lb/ton for conveying and screening. Wet suppression systems using water mixed with a chemical wetting agent are the least expensive to install and operate, although problems such as clogging of tertiary screens may arise when a fine-sized stone product is desired. Fabric filter systems, which are the most costly, allow recovery of a portion of the dust for use in other operations or for marketing. Combinations of wet dust suppression and fabric filtering provide the benefits of each system at a cost less than that for a fabric system alone. Efficiencies approaching 95% can be obtained when each system is properly sized, installed, and maintained. Annual operating costs for dust abatement systems in stone crushing operations range from $8394 to $46,606 (0.9t3.2 cents/ton), and fixed capital expenditures range from $49,129 to $249,162.

49524 **APTIC NO. 71896**

Ford, Andrew

ENVIRONMENTAL POLICIES FOR ELECTRICITY GENERATION: A STUDY OF THE LONG-TERM DYNAMICS OF THE SO2 PROBLEM. *Dartmouth College, Hanover, N. H., Thayer School of Engineering, National Science Foundation Research Applied to National Needs Grant GI-34808X, Rept. DSD-16, 25p., Feb. 1, 1975. 27 refs.*

A computerized model was constructed to determine the severity of sulfur dioxide constraints on the use of coal for electrical power generation and to analyzed the effectiveness of alternative political, economic, and technical policies designed to reduce the severity of such constraints. Endogenous variables in the model included: economic costs; substitution of investment between coal, oil, and gas; perceived damage from SO2; reliability of stack gas devices; and sulfur content regulations. Simulations indicated that retrofitting coal plants with scrubbers is an effective method for reducing both SO2 emissions and utility demand for oil and gas. However, the reduction of SO2 emissions to values below the 1950 levels requires the development and implementation of other abatement technologies such as fluidized-bed combustion, gasification, and solvent refining. Conservationist policies that reduce the growth in demand for electricity reduced SO2 emissions and lower oil and gas requirements to levels below those achieved by relaxing sulfur content regulations.

49525 **APTIC NO. 71724**

Fujisawa, H., H. Kobayashi, and S. Nagata

FUEL INJECTION APPARATUS FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikanyo nenryo funsha sochi). Text in Japanese. (Nihon Denso Co., Ltd., Aichi Prefecture (Japan)) Japan. Pat. Sho 50-206. 5p., Jan. 7, 1975. 2 refs. (Appl. May 6, 1970, 1 claim).*

A fuel injection apparatus for a rapid cut of fuel supply to internal combustion engines during deceleration is described. The fuel cut is achieved by an electromagnetic switch. The number of engine revolutions are determined by the movement of cam shafts, and one of the cam shafts is made of electroconductive and nonconductive materials which generate an intermittent electrical signal to the magnetic switch. The device can cut the fuel in any deceleration condition, therefore it is more advantageous than fuel injection utilizing the intake load variation which can operate only under certain deceleration conditions.

49526 **APTIC NO. 72294**

Fukasawa, Shoichi

AIR POLLUTION BY AUTO EXHAUST GASES AND ITS CONTROL. *(Jidosha haigasu ni yoru taiki osen to sono boshi). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Sapporo, p. 29-38, 1975. (Presented at the Japan Society of Mechanical Engineers, Lecture Meeting, Sapporo, Japan, Feb. 7, 1975.)*

Harmful air pollutants from gasoline engines include carbon monoxide, hydrocarbon, aldehyde, and lead compounds while those from diesel engine include CO, HC, aldehyde, sulfur dioxide, and carbon particles. Of those factors which affect the formation of the exhaust, air/fuel ratio is the most important. Carbon monoxide and HC concentrations are reduced while NOx concentration increases when an air/fuel ratio lower than the theoretical ratio (about 15 for gasoline engine) is used. Carbon monoxide concentration can be reduced by heating the air-fuel mixture or air for better gasification. A new trend for CO reduction is the use of an electronically controlled fuel apparatus. A combustion chamber with small surface/volume ratio is desirable for HC reduction. Nitrogen oxides are controlled by delaying spark ignition, reducing the compression ratio, and by exhaust gas recirculation.

49527 **APTIC NO. 71822**

Fukui, Toshio

FILTER CLOTH RAPPER IN DUST COLLECTOR. *(Rofuzutsu gata shujinki ni okeru rofuzutsu uchikui). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 50-2136. 3p., Jan. 21, 1975. (Appl. June 17, 1971).*

An improved rapper for filter cloth type dust collectors is described. The rapper is made of elastic wires and shaped in a loop. Two loops are bound together to strengthen the rapper. The advantages of the rapper are that large dust particles do not stick to it, its construction is very simple and cheap, and it is durable.

49528 **APTIC NO. 72352**

Gochi, Shunsuke

DUST COLLECTOR. *(Shujinki). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 50-2134. 2p., Jan. 21, 1975. (Appl. June 16, 1971).*

A dust collector using centrifugal force is described. A funnel-shaped casing contains a rotating fan with several wings at both sides. Air is sucked into this fan and dusts in the air are separated by the centrifugal force and accumulated at the bottom of the casing. The cleaned air is freed from the top of the casing, however the wings on the fan on this side are designed to produce an air flow back toward the fan; therefore, a restriction of air flow is imposed which improves the efficiency of dust separation. Using this apparatus, no further filtration of cleaned air is necessary.

49529 **APTIC NO. 72280**

Gooch, John P. and Norman L. Francis

THEORETICALLY BASED MATHEMATICAL MODEL FOR CALCULATION OF ELECTROSTATIC PRECIPITATOR PERFORMANCE. *J. Air Pollution Control Assoc., 25(2):108-113, Feb. 1975. 7 refs.*

A computerized mathematical model that relates collection efficiency to electrostatic precipitator size and operating parameters is described. Procedures are outlined for calculating particle charging rates, electric field as a function of position in wire-plate geometry, and the theoretical expected collection efficiencies for various particle sizes and precipitator operating conditions. Although calculation of overall collection efficiency of polydisperse particulate material in an electrostatic precipitator from the theoretical relationships results in a considerably higher value than that obtained from performance measurements on full-size units for coal-fired power boilers, corrections applied for estimating the effects of non-uniform gas flow, rapping reentrainment, and gas by-passing the electrified sections reduce the overall values of calculated efficiency to the range of values observed from field measurements. Variation in predicted performance caused by varying the standard deviation of a log normal size distribution with a given mass median diameter is investigated with computer simulation which predicts decreasing performance with increasing values of particle size standard deviation. The decrease results from the influence of the increasing proportions of fine particulate which are present with larger values of standard deviation.

49530 **APTIC NO. 72281**

Hall, H. J.

DESIGN AND APPLICATION OF HIGH VOLTAGE POWER SUPPLIES IN ELECTROSTATIC PRECIPITATION. *J. Air Pollution Control Assoc., 25(2):132-138, Feb. 1975. 11 refs.*

The design and application of high voltage power supplies for electrostatic precipitators is reviewed, with particular emphasis on requirements and methods for achieving the high performance and reliability under various operating conditions and precipitator inputs. Solid-state, automatic voltage and current-limit control with multiple signal feedback loops can provide good regulation and fast response to transient disturbances. Automatic voltage control is typically based on maintaining an optimum average precipitator sparking rate which must be adjustable according to application and dust concentration. Excessive sparking in outlet sections must be avoided so that gains obtained by increasing voltage are not offset by dust losses due to voltage off-time, spark blasting, and reentrainment of dust on the plates. Design and operating requirements of electrostatic precipitators are reviewed in terms of various applications, including high resistivity ash and high temperature and/or high pressure gas treatment. Typical precipitator voltage and current waveforms are illustrated along with a schematic of a modern power supply with automatic voltage and current control.

49531 **APTIC NO. 71739**

Hanley, W. J.

LUBRICATION AND SERVICE REQUIREMENTS OF 1975 CARS AND LIGHT TRUCKS. *NLGI Spokesman, 38(10):354-359, Jan. 1975. (Presented at the National Lubricating Grease Institute, Annual Meeting, 42nd, Chicago, Ill., Oct. 1974.)*

Service requirements for 1975 cars and light trucks are reviewed, with particular reference being made to procedures for servicing catalytic converters. Although the converters are shielded against mechanical damage from normal driving hazards, special lifting precautions must be taken when hoisting the vehicle for service to avoid damaging the unit. Converters made by General Motors or the American Motors Corporation may be serviced after the 50,000 mi useful period by vibrating the unit and vacuuming out the beads and blowing in a new charge. The total converter is replaced as a unit in Ford and Chrysler products. Unleaded gasoline must be used in all vehicles with converters because of the poisoning effect that lead and its scavengers have on the catalyst. The progress that has been made in reducing pollutants by various add-on devices and engine modifications is diagrammatically illustrated with a typical exhaust emission control system layout.

49532 **APTIC NO. 71726**

Hashiura, Hiromasa and Tetsu Nisaka

CLOSED CYCLIC OPERATION SYSTEM FOR MOTOR. *(Heisa junkan shiki gendoki unten hoshiki). Text in Japanese. (Ueki Gas Science Co., Ltd., and Torisha Rika Lab., Tokyo (Japan)) Japan. Pat. Sho 50-208. 4p., Jan. 7, 1975. 2 refs. (Appl. June 14, 1970, 1 claim).*

A closed recirculation method for exhaust gas from internal combustion engines is described. After engine exhaust gases are cooled by a radiator, hydrocarbon, carbon monoxide, carbon dioxide, sulfur oxides, and nitrogen oxides in the gases are absorbed by a gas cleaner filled with absorbent such as activated carbon and molecular sieves. The purified gas is then mixed with oxygen and an inert gas such as helium supplied from compressed tanks, which is further mixed with fuel at the carburetor before entering the engine. Therefore, no gas is emitted outside the recirculation system and the completely closed circulation is achieved. Moisture produced during combustion is drained from the radiator. The system is applicable to any internal combustion engine, including engines for underwater use.

49533 **APTIC NO. 71689**

Haver, Frank P., R. D. Baker, and M. M. Wong

IMPROVEMENTS IN FERRIC CHLORIDE LEACHING OF CHALCOPYRITE CONCENTRATE. *Bureau of Mines, Nev., Reno Metallurgy Research Center, RI 8007, 20p., 1975. 11 refs.*

An improved technique for the ferric chloride leaching of chalcopyrite concentrate is described in which elemental sulfur, as well as copper, is recovered as an alternative to the production of sulfur dioxide. Over 99% of the elemental sulfur in the leach residue can be extracted at ambient temperature with an ammonium sulfide solution. Heating the pregnant solution precipitates crystals of rhombic sulfur (99.5% purity) and liberates ammonia and hydrogen sulfide for recycling. Copper with a purity in excess of 99% is obtained from the leach solution by electrolysis (diaphragm cell) at an energy requirement of less than 0.7 kW/hr/lb. During the electrolysis, part of the divalent iron is oxidized to the trivalent form at the anode; thus, there is no chlorine evolution. The leach solution is regenerated by direct oxidation of the spent electrolyte with air or oxygen in a turboaerator at 80 C. This precipitates the iron dissolved during leaching in an easily filterable form and converts the remaining divalent iron to trivalent iron. (Author abstract modified)

49534 **APTIC NO. 72353**

Hayashi, Toshihiro

DUST COLLECTOR. *(Shujinsochi). Text in Japanese. (Ishikawajima Harima Heavy Industry Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-2133. 3p., Jan. 21, 1975. (Appl. June 3, 1971).*

A dust collector consisting of a combination of cyclone and filtration dust collectors is described. The filtration unit is placed on top of the cyclone unit. Dust containing air is introduced into the cyclone unit to remove larger dusts and finer dusts are further removed by the filtration unit filled with sands or other filter materials. By inversely flowing the air through the filtration unit, the accumulated dusts can be removed from it, while the accumulated dusts in the cyclone are removed from the bottom of the cyclone unit. The apparatus is very compact and saves installation space. By using several of these apparatuses, continuous dust removal can be achieved.

49535 **APTIC NO. 72187**

Heinsohn, R. J., S. H. Levine, R. J. Fjeld, and G. W. Malamud

RADIATION CHARGING: A NOVEL WAY TO CHARGE FINE PARTICLES ELECTRICALLY. *J. Air Pollution Control Assoc., 25(2):179-184, Feb. 1975. 11 refs.*

A scheme for electrically charging fine particles using electric and magnetic fields in conjunction with ionizing radiation is described, and mathematical expressions are provided for predicting the charge acquired by particles. High energy electrons either supplied directly by a beta source or indirectly by Compton scattering of gamma radiation, interact with gas molecules in air to create positive and negative ions. A magnetic field which is not intense enough to affect appreciably the molecular ions causes the highly energetic electrons to spiral about the field lines and lose all of their energy in the confined region through which the dust and air pass. The electric field is not of sufficient strength to affect the energetic electrons and serves to separate the ions and create regions of predominantly positive ions near the cathode and negative ions near the anode. The ions attach to particles moving through the precipitator duct, putting a net positive charge on particles near the cathode and a net negative charge on those near the anode. Preliminary experiments indicate that the theoretical model upon which scheme is based must be modified to include bulk motion. A more sophisticated model is also needed to predict the reduction in ion generation rate observed following the application of magnetic field. The scheme shows promise not only for electrostatic preipitators per se but also for filtration and wet collection systems.

49536 **APTIC NO. 72042**

Hisatomi, Takashi and Kenichi Sasaki

VAPORIZER WITH COMPENSATION APPARATUS IN DECELERATION. *(Gensoku hosho sochi tsuki kikaki). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama-Shi (Japan)) Japan. Pat. Sho 50-2775. 3p., Jan. 29, 1975. 1 ref. (Appl. March 11. 1971, 1 claim).*

A carburetor with a compensation apparatus during deceleration was designed for hydrocarbon reduction in exhaust gas. The device features a throttle valve, a by-pass for air flow, two jets controlling the air flow and fuel flow respectively, a regulating valve for the by-pass, a negative pressure chamber which operates the regulating valve, a control valve and a jet which controls the negative pressure for the negative pressure chamber, and a second negative pressure chamber for operating the control valve. The function of the device is to open the regulating valve at deceleration through the operations of the two negative pressure chambers so that optimum air-fuel mixture is supplied.

49537 APTIC NO. 71725

Homoro, Yukio

CONTROL VALVE FOR EXHAUST GAS RECIRCULATION. *(Haiki gasu kanryuyo kontororu barubu). Text in Japanese. (Hitachi Manufacturing Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-209. 4p., Jan. 7, 1975. (Appl. Aug. 31, 1970, 1 claim).*

Control valves for a partial exhaust gas recirculation system designed to reduce the nitrogen oxides emission are described. A combination of two or more butterfly valves are employed to control the gas recirculation, and one of the valves is linked to a throttle valve of the carburetor and opens to 0 to 90 degrees depending on movement of the throttle valve, while the rest of butterfly valves linking to the first valve open 0 to 180 degrees. These valves are linked to each other by fan-shaped gears. When 5% of the exhaust gas was recirculated, the NOx formation was reduced by 50%. Recirculation of up to 20% of the exhaust gas could be achieved without distorting engine performance and the NOx formation was reduced more than 80%.

49538 APTIC NO. 72357

Horiki, Seinosuke

HARMFUL GAS REMOVAL APPARATUS. *(Yugai gasu jyokkyo sochi). Text in Japanese. (Nagoya Petrochemical Industry Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-188. 2p., Jan. 7, 1975. 1 ref. (Appl. Aug. 10, 1971).*

An apparatus for harmful gas removal, such as trapping sulfuric acid mist generated by a dry method flue gas desulfurization process, is described. The apparatus consists of two absorbing beds filled with appropriate absorbents and water sprinklers above each bed. For example, a sulfur dioxide containing flue gas enters from the bottom of the apparatus and passes through the first bed filled with activated carbon which absorbs SO2 gas. The water sprinkler above the bed washes out the absorbed SO2 regenerating the carbon bed. The flue gas moves on to the second bed filled with activated carbon or alumina at which the generated sulfuric mist is absorbed. The latter absorption bed can also be regenerated by a second water sprinkler installed above the second bed. By selecting the absorbent materials, different compounds in flue gases can be effectively removed.

49539 APTIC NO. 72044

Ide, Yasuo

CHIMNEY DESIGN. *(Entotsu kozobutsu). Text in Japanese. (Mitsubishi Heavy Industrial Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-1094. 3p., Jan. 14, 1975. (Appl. Oct. 30, 1970, 1 claim).*

A new chimney design aiming at better air pollution control and cooling efficiency was developed. The design features a chimney attaching to the outside wall of a cooling tower. Unlike the conventional chimney design which has the chimney and part of the flue duct inside the cooling tower, the new design increases the cooling efficiency since there is no heat transfer to the cooling air in the tower. Better flue gas diffusion can also be expected when the chimney is on the upstream side of the wind. Other advantages include easy repair and maintenance.

49540 APTIC NO. 72292

Imai, T.

VENTILATOR WITH DUST COLLECTOR APPARATUS. *(Kona tsubujo butsu hoshu sochi tsuki benchireta). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 50-1818. 2p., Jan. 18, 1975. (Appl. April 12, 1974).*

This invention relates to a ventilator featuring a wing blower and a cylindrical wind tunnel in front of it, a partition which separates the wind tunnel in half, a wind duct which passes through the partition, inclined vanes surrounding the wind duct, a guide cylinder which forms an annulus channel with the wind tunnel, and a drainage at the bottom of the annulus channel. Air is introduced by the wing blower into the wind tunnel and swirling is caused by the inclined vanes so that particles in the air are collected in the annulus channel by centrifugal forces. The ventilator has the advantage of low ventilating resistance.

49541 APTIC NO. 72030

Ishihara, Tatsuya, Etsuji Takai, and Nobumasa Higo

AUTOMOTIVE EXHAUST GAS CLEANING DEVICE. *(Jidosha-yo haiki joka sochi). Text in Japanese. (Nihon Denso Co., Ltd., Aichi (Japan)) Japan. Pat. Sho 50-222. 4p., Jan. 7, 1975. (Appl. Dec. 27, 1970, 1 claim).*

An automotive exhaust gas cleansing device was designed for reduction of hydrocarbon emission at the initial period of deceleration. Air is injected into an intake pipe in order to maintain the increase in negative pressure below a certain level thereby reducing HC emission; simultaneously, the ignition timing is delayed for preventing the loss in engine brake as the result of increase in negative pressure. The device consists of a diaphragm placed between the negative pressure chamber and upper chamber and valve attached to a rod connected to the diaphragm. With the increase in negative pressure in the intake pipe, the diaphragm is pressed down, thus opening the valve and allowing air injection into the intake pipe. In several seconds, the pressure in the upper chamber is equalized with that of the negative pressure chamber, thus raising the diaphragm to the original position, thereby closing the valve. Simultaneously, the ignition timing controlled by negative pressure is delayed to prevent deterioration in engine brake. This device is effective only for a period of several seconds at deceleration for reduction in HC emission.

49542 APTIC NO. 71768

Itokawa, Yoshihiko

PREPARATIVE APPARATUS FOR RING HANGER FOR COTTRELL DISCHARGE WIRE TERMINAL. *(Kottoreru hodensen tanbu no tsurikanbu kako sochi). Text in Japanese. (Onoda Cement Co., Ltd., Onoda (Japan)) Japan. Model Util. Sho 50-2606. 2p., Jan. 23, 1975. (Appl. Oct. 6, 1970).*

An apparatus for processing the terminal of discharge wires in Cottrell dust collectors is described. The wire terminal fixed to the dust collector must be looped. This apparatus improves the looping technique. There are four wheels, two of which are stationary on spindles, and the wire is hooded on these wheels. Two other wheels, which can move, squeeze the wire, forming it into a loop shape. The apparatus does not impair any part of the wire, therefore the disconnection of discharge wires during operation of the dust collector was considerably reduced. The advantages of the apparatus are uniformed loop shape and easy operation.

49543 APTIC NO. 72239

Kamata, H. and N. Tanaka

ELECTRODE PLATE SUPPORTER FOR ELECTRIC PRECIPITATOR. *(Denki shujin sochi no denkyoku shiji sochi). Text in Japanese. (Toa Kosan Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-2605. 3p., Jan. 23, 1975. (Appl. Sept. 29, 1970, 1 claim).*

A supporting device for a number of cathode and anode plates placed alternately in parallel at specified intervals was designed for easy assembling and accuracy in spacing. At one end of the cathode or anode plates, a tubular extrusion is formed in the length equal to the interval between two cathodes or two anodes, while the opening for inserting the above- mentioned tubular extrusion is placed concentrically on the anode or cathode plates. At the other end of the anode or cathode, a tubular extrusion similar to the above-mentioned one is formed, while the opening for inserting the tubular extrusion is placed on the cathode or anode, so that each electrode plate has an extrusion on one end and an opening on the other end. The electrode plates are fastened by means of supporting rods pushed through tubular extrusions on each end.

49544 **APTIC NO. 72028**

Kawazoe, Yukinao

SMOKE EXHAUST TECHNIQUE. *(Haien hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 50-1095. 2p., Jan. 14, 1975. 1 ref. (Appl. Nov. 13, 1970, 1 claim).*

The building costs of smoke stacks increase sharply with the increase in stack height, since the moment exerted at the base of stack increases in proportion to the square of the increase in stack height. For reduction of building costs, a stack with adjustable height was designed. It consists of two or more sections, which can be raised or lowered, depending on the wind velocity, by motorized wire and pulley, gear, or screw mechanisms. The diameter of the base section is the smallest, and those of upper sections increase succesively, so that the upper section can be slid down alongside of the lower section. The lower end of the base section is supported by the foundation and the upper end by the lower part of the upper section, which is supported by a truss. For example, a stack with 150 m base section and 180 m upper section is used as a 300 m stack at wind velocity less than 25 m/sec. At wind velocity higher than 25 m/sec, the upper section is lowered, and the exhaust gas emission continues with lowered stack. In this case, however, the high wind velocity facilitates the dispersion of smoke, which compensates the reduction in stack height.

49545 **APTIC NO. 72237**

Kitagawa, Tetsuzo

EXPLOSION OF DUST COLLECTOR EQUIPMENT IN ELECTRIC FURNACES AND ITS COUNTERMEASURES. *(Denkiro no shujin setsubi no bakuhatsu jiko to taisaku). Text in Japanese. Anzen Kogaku (J. Japan. Soc. Safety Eng.), 14(1):48-54, Jan. 1975. 4 refs.*

The cause for frequent explosions in dust collectors attached to electric furnaces for regenerating scrap steel was investigated with a case study of an explosion that occurred in Feb. 1974 in Yokohama. An explosive gaseous mixture that filled the exhaust duct system was the direct cause for explosion. The composition of the explosive gaseous mixture was hydrogen carbon monoxide, methane, and ethylene produced by the pyrolysis of lubricant on lathe dust charged into the furnace as a part of the scrap material. As countermeasures against explosion, the flow rate of the exhaust fan should be maintained above a certain level to prevent accumulation of explosive gaseous mixture in the exhaust duct, the ratio of lathe dust should be reduced to 40-60% since the explosive gases are produced from the lubricant on lathe dust, and the lathe dust should be charged only after the furnace temperature is elevated above 600 C.

49546 **APTIC NO. 72360**

Kitayama, Teruhide

CHOICE OF EQUIPMENT AND REQUIREMENT IN DEODORIZATION. PART I. *(Akushu jokyo taisaku ni okeru jokyo sochi no sentei to soreni fuzui suru joken. Sono-1). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 4(8):27-37, Jan. 1975.*

The basic planning procedure for malodor control measures based on the investigation of malodor pollution, malodorants formation mechanisms, and their effect on the living environment are discussed along with basic conditions for selecting deodorization devices. The common deodorization device consisting of hood, intake duct, deodorizer, fan, exhaust duct, and exhaust outlet is described with schematic diagrams. The design procedure for the exhaust system, functional descriptions of each component part, and design specifications are described with actual examples of design calculations in reference to the degree of danger and toxicity, occurrence frequency, permissible concentration and control flow rate.

49547 **APTIC NO. 72346**

Komebechi, Narimitsu

ELECTROSTATIC PRECIPITATOR OF WET METHOD. *(Shisshiki denki shujinki). Text in Japanese. (Furukawa Mining Industry Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-2604. 3p., Jan. 23, 1975. (Appl. Sept. 17, 1970).*

A wet type electrostatic precipitator which requires less water than conventional electrostatic precipitators is described. Water sprinklers to wash out the deposited dusts from the electrode plates are installed at both the top and side of the electrode plates. The electrode plate with the narrowest width is used at the inlet portion of the precipitator and plates with gradually increased width are used towards the outlet. These modifications improve the dust washout efficiency, since they give enough wetness on all the plates. Washout is made continuously, therefore no intermittent operation of the precipitator is necessary. The precipitator consumes 25% to 33% of the water required for conventional electrostatic precipitators.

49548 **APTIC NO. 71821**

Komebuchi, Narimitsu

ELECTRODE RAPPING APPARATUS FOR ELECTROSTATIC PRECIPITATOR. *(Denki shujinki ni okeru shujin denkyoku tsuchuchi sochi). Text in Japanese. (Furukawa Mining Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-2603. 3p., Jan. 23, 1975. (Appl. Sept. 17, 1970).*

An electrode rapping apparatus for electrostatic precipitators is described. The apparatus allows removal of stubborn dusts from electrodes by varying the rapping force and also prevents the fallen dust from being carried by updraft. A series of electrode plates are hung from a guide beam using a needle, and the bottom of each plate is fixed with another guide beam except for one of the end plates which can slide outward with movement of a rod geared in a cam shaft. When the end plate comes back inward, it hits the adjacent electrode plates, thus causing the rapping of the dust on the plates. The swing angle of the end plate can be adjusted by changing the position of its hanger on the upper guide beam, and this changes the inward momentum of the plate return. The weight of the end plate can also be changed for additional momentum if necessary.

49549 **APTIC NO. 75082**

Koutsoukos, E. P., J. L. Blumenthal, M. Ghassemi, and G. Bauerle

ASSESSMENT OF CATALYSTS FOR CONTROL OF NOX FROM STATIONARY POWER PLANTS, PHASE I, VOLUME I (FINAL REPORT). *TRW Systems Group, Redondo Beach, Calif., and California Univ., Los Angeles, School of Engineering and Applied Sciences, Environmental Protection Agency Contract 68-02-0648, Program Element 1AB014, ROAP 21ADF-003, Rept. EPA-650/2-75-001-a, 280p., Jan. 1975. 57 refs.*

NTIS: PB 239745/AS

The technical and economic feasibility of utilizing catalytic processes for the abatement of nitrogen oxide emissions from stationary power plants was studied. The investigations involved a literature survey and the development of a data bank on pertinent articles and patents, experimental screening tests on selected promising catalysts, and preliminary design and cost analysis of candidate processes adapted to new and/or existing power plants. At least two types of catalytic NOx control processes appear adaptable to power generating plants: selective reduction of NOx with ammonia on non-noble metal catalysts and the simultaneous nonselective reduction of NOx and sulfur oxides with coal-derived reductants on non-noble metal catalysts.

49550 **APTIC NO. 75083**

Koutsoukos, E. P., J. L. Blumental, M. Ghassemi, and G. Bauerle

ASSESSMENT OF CATALYSTS FOR CONTROL OF NOX FROM STATIONARY POWER PLANTS, PHASE I VOLUME II - DATA BANK CITATION INDICES (FINAL REPORT). *TRW Systems Group, Rodondo Beach, Calif., Environmental Protection Agency Contract 68-02-0648, Program Element 1AB014, ROAP 21ADF-003, Rept. EPA-650/2-75-001-b, 268p., Jan. 1975. 250 refs.*

NTIS: PB 239746/AS

Computerized indices by author, keyword, and accession number covering over 250 documents relating to the catalytic control of nitrogen oxides from stationary power plants are presented. The citations refer to literature on the following subjects: the decomposition and oxidation of NOx; the selective and nonselective catalytic NOx reduction with actual or synthetic flue gases and internal combustion engine exhaust; basic research on catalytic NOx decomposition, oxidation, and reduction; basic studies on ammonia decomposition and oxidation; preparation procedures for NOx abatement catalysts; simultaneous NOx-sulfur oxide abatement; and economic and engineering analyses on NOx-SOx control processes proposed for power plant or related source utilization. Each document is keyworded to reflect both broad and narrow areas of NOx research and development.

49551 **APTIC NO. 71769**

Maruoka, S. and K. Masaki

RAPID ENGINE WARMER FOR AUTOMOBILE. *(Jidosha-yo kyushoku danki sochi). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama-shi (Japan)) Japan. Pat. Sho 50-1649. 3p., Jan. 20, 1975. (Appl. April 24, 1971, 1 claim).*

An automotive emission control device was developed designed for the reduction in pollutant emission immediately after the ignition while the engine is still cool. Based on the fact that the exhaust gas temperature is rapidly elevated by ignition delay simultaneously reducing the exhaust gas concentration, the ignition timing during idling is delayed markedly, while the throttle is opened to stabilize the engine. The device consists of a water temperature sensor switch, a neutral switch, a starter motor relay switch, an engine speed sensor, a throttle by-pass valve, a distributor, a battery, an ignition key switch, and three relays. With the ignition of the engine, the throttle by-pass valve is opened thereby rapidly increasing the engine speed to 1300 rpm in 2-3 secs. At engine speed 1300 rpm, the ignition timing is delayed (30-40 degrees) and the engine is warmed up rapidly. At a certain water temperature, the temperature sensor switch is turned off, and the driving condition is put back to the normal state.

49552 **APTIC NO. 72258**

Matsushita, Masao

DUST COLLECTOR. *(Shujinki). Text in Japanese. (Matsushita Electric Power Tool Co., Ltd. (Osaka, Japan)) Japan. Model Util. Sho 50-2138. 3p., Jan. 21, 1975. (Appl. July 3, 1971).*

A dust collector used for trapping dusts generated in grinding works is described. A water bath is used to trap dusts. An air intake pipe is dipped into the water bath and air is bubbled through the water from the tip of the pipe which is covered with a cap having several fine holes. The water level in the bath can be viewed from a window. There is a plate above the water level to hamper the hopping air bubbles. The precipitated dusts are drained out with water after the use of the collector.

49553 **APTIC NO. 72351**

Matsushita, Masao

DUST COLLECTOR. *(Shujinki). Text in Japanese. (Matsushita Electric Power Tool Co., Ltd., Osaka (Japan)) Japan. Model Util. Sho 50-2137. 3p., Jan. 21, 1975. (Appl. July 4, 1971).*

A dust collector used for trapping dusts generated in grinding works is described. A water bath is used to trap dusts. An air intake pipe is dipped into the water bath and air is bubbled through the water from the tip of the pipe which is covered with a cap having several fine holes. The tip of the pipe is fixed on a side board whose both ends are equipped with an air bag floated in the bath. The air bags are used to adjust the height of the tip of the pipe automatically to the water level of the bath so that the tip is positioned correctly under the water level regardless of the effect of evaporation of water due to the hot air bubbling. There is a plate above the level to hamper the hopping air bubbles. The precipitated dusts are drained out with the water after the use of the collector.

49554 **APTIC NO. 72202**

McCain, Joseph D., Joseph P. Gooch, and Wallace B. Smith

RESULTS OF FIELD MEASUREMENTS OF INDUSTRIAL PARTICULATE SOURCES AND ELECTROSTATIC PRECIPITATOR PERFORMANCE. *J. Air Pollution Control Assoc., 25(2):117-121, Feb. 1975. 1 ref.*

Source size distribution measurements (0.1-5 micron size range) for six classes of industrial particulate sources are presented along with fractional efficiency measurements on five full scale electrostatic precipitators and one pilot scale precipitator. The sources consisted of a coal fired boiler, an open hearth furnace, Kraft recovery boilers, a submerged arc ferro-alloy furnace, a packed-bed sulfur dioxide scrubber, and a spray scrubber following an aluminum reduction furnace. The data obtained indicate a minimum in the collection efficiency versus particle size relationship for the size range between 0.1 and 0.5 micron. Increasing collection efficiencies are obtained for particles larger than a few microns and for particles smaller than 0.2 micron. The latter observation suggests that electrostatic precipitation is a promising means of collecting extremely fine particles. The overall mass efficiencies obtained with the six electrostatic precipitators tested ranged from 96.2-99.8%.

49555 **APTIC NO. 75092**

Miller, B., G. E. R. Lamb, and P. Costanza

INFLUENCE OF FIBER CHARACTERISTICS ON PARTICULATE FILTRATION (FINAL REPORT). *Textile Research Inst., Princeton, N. J., Environmental Protection Agency Contract R-800042, Program Element 1AB012, ROAP 21ADL-022, Rept. EPA-650/2-75-002, 55p., Jan. 1975. 14 refs.*

NTIS: PB 239997/AS

The influence of five fiber parameters (cross-sectional shape, linear density, surface roughness, crimp, and staple length) on the filtration performance of model nonwoven fabrics was investigated. Nonwoven fabrics made from 32 polyester fiber samples were used to filter fly ash particles from a stream of air. Filter performance was assessed by measuring pressure drop across the filter, collection efficiency, and particle size distribution. The following filtration improvements were statistically observed at 95% confidence: efficiency increased with the use of trilobal (rather than cross-section) fibers with no detrimental effect on drag; both efficiency and drag were improved by using crimped (rather than uncrimped) fibers; and efficiency was improved by using three (rather than six) denier fibers, though at the cost of greater drag. These efficiency improvements were especially pronounced for fine particles (approximately 2.5 micron). Non-statistically, except for epitropic fibers with very rough carbon-embedded surfaces, rougher fibers appeared more efficient in removing fine particles. The application of direct current voltages to 100% nonconducting polyester filters resulted in considerable efficiency increases. No such effects were observed with polyester filters incorporating 50% epitropic fibers. (Author abstract modified)

49556 **APTIC NO. 71767**

Mizuno, Akira

PREVENTION APPARATUS OF HARMFUL EXHAUST GASES IN INTERNAL COMBUSTION ENGINE. *(Nainen kikan no yugai haishutsu gasu boshi sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 50-213. 6p., Jan. 7, 1975. 1 ref. (Appl. Jan. 24, 1970, 2 claims).*

An emission control device designed for toxic gases, particularly carbon monoxide, during deceleration employs a mechanism for increasing air supply while reducing the fuel supply. An air inlet pipe with electromagnetic valve is connected to the intake manifold. When the vehicle speed or engine speed detector mechanism registers a certain set value, the fuel supply control mechanism is actuated, reducing the throttle valve opening. Simultaneously, the electromagnetic valve of the air inlet pipe is also actuated, and the valve is opened. In this device, during deceleration, the fuel supply is reduced while the air supply is increased, thus reducing the emission of toxic gases. In a second invention, the throttle valve is designed to close during deceleration, cutting off the the fuel supply, while the electromagnetic valve is opened for injecting air.

49557 **APTIC NO. 72347**

Mochibara, Hiroyuki

DUST INDICATOR FOR DUST COLLECTOR. *(Shujin hyoji sochi). Text in Japanese. (Sanyo Electric Co., Ltd., Osaka (Japan)) Japan. Model Util. Sho 50-2607. 2p., Jan. 23, 1975. (Appl. Oct. 5, 1970).*

A device to indicate the amounts of accumulated dust in electrostatic precipitators is described. A small light is installed within a precipitator, and its light reflections by two electrode plates (dust deposition plate and reference plate) are displayed together on a screen (such as frosted glass) through different colored filters. For example, if the reflections by the reference plate and deposition plate are passed through a blue filter and red filter respectively, the displayed color on the screen changes from purple to blue. Since no dust is deposited on the reference plate, the color change on the screen indicates the amount of dust deposited on the dust deposition plate. A shielding plate is employed between these two plates to prevent interference from reflected light.

49558 **APTIC NO. 71765**

Morita, S. and H. Wada

AIR INTAKE APPARATUS FOR ENGINE. *(Engin no kyuki sochi). Text in Japanese. (Toyo Industrial Co., Ltd., Hiroshima (Japan)) Japan. Model Util. Sho 50-736. 2p., Jan. 10, 1975. 2 refs. (Appl. May 23, 1970).*

A device to regulate the fuel to air mixture during automobile operation is described. A bypassing air line equipped with a spring operated value is installed to connect the air cleaner and engine intake. Excess air is supplied when the valve opens and the amount of air is varied with a cone shaped valve seat. When deceleration occurs, the decreased pressure within the cylinders effects opening of the valve allowing air enriched fuel mixture to enter the combustion chambers. Both afterburning and knocking due to inadequate fuel to air ratio can be prevented by the device. The device also reduces the unburned components in exhaust gas.

49559 **APTIC NO. 71723**

Moritani, Hisanori

EXHAUST GAS RECIRCULATION APPARATUS. *(Haiki gasu kanryu sochi). Text in Japanese. (Hitachi Manufacturing Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-210. 3p., Jan. 7, 1975. (Appl. Sept. 11, 1970, 1 claim).*

An auto exhaust gas recirculation device to reduce nitrogen oxides emission is described. It contains a recircualtion control valve and an on-off exhaust gas intake valve, and between these two valves a pressure control valve. The recirculation control valve is linked to a throttle valve on the carburetor. The pressure difference (thus flow difference) between the carburetor and recirculation tube regulates the opening of the pressure control valve, thus the recirculating gas ratio is kept constant regardless of the amount of intake of fresh air-fuel gas mixture.

49560 **APTIC NO. 71815**

Muermann, Herbert

TESTING METHODS FOR AIR FILTERS. *(Pruefverfahren fuer Luftfilter). Text in German. Wasser Luft Betrieb, 19(1):9-14, 1975. 9 refs.*

Testing methods for air filters and basic concepts in connection with air filtration are presented. The SFI test using quartz dust is suitable for the determination of the fractional separation efficiency. The AFI Code requires the use of a mixture of street dust, soot, and cotton linters for a gravimetric test which is combined with a subsequent testing of the residual dust after the filter on an absolute filter. The ASHRAE Standard 52-68 makes distinction between efficiency and penetration, using coloration and gravimetric tests. Absolute filters and filters designed for suspended dust are tested according to the dioctyphthalate (DOP) or oil mist test.

49561 **APTIC NO. 71909**

Mularz, Edward J., Jerrold D. Wear, and Peter W. Verbulecz

POLLUTION EMISSIONS FORM SINGLE SWIRL-CAN COMBUSTOR MODULES AT PARAMETRIC TEST CONDITIONS. *National Aeronautics and Space Administration, Cleveland, Ohio, Lewis Research Center, Work Unit 501-24, NASA TM X-3167, Rept. E-8017, 35p., Jan. 1975. 11 refs.*

Single swirl-can combustor module designs were evaluated for nitrogen oxides emissions at simulated full-power gas turbine operation. Exhaust pollutants were measured from modules burning Jet A fuel and operating over a pressure range of 69 to 276 newtons/sq cm, a fuel-air ratio range of 0.01 to 0.04, at an inlet air temperature of 733 K, and at a constant reference velocity of 23.3 m/sec. Eleven swirl-can models exhibited NOx emission levels lower than that from conventional gas turbine combustors. Higher pressure drop module designs may further reduce the NOx concentrations based on the trends of the test results. The NOx emissions varied with pressure according to the expression NOx approximately equals delta to the power x, where delta is the normalized combustor inlet air pressure. The exponent x was a different value for each model design, varying from 0.27 to 0.74. (Author summary modified)

49562 **APTIC NO. 72050**

Murata, Junro

DUST COLLECTOR BY WET METHOD. *(Shisshiki shujin sochi). Text in Japanese. (Ube Kosan Co., Ltd., Ube-shi (Japan)) Japan. Pat. Sho 50-1108. 3p., Jan. 14, 1975. (Appl. Aug. 24, 1971, 1 claim).*

A wet-type dust collector that uses a centrifugal separator which recovers water for reuse was designed. The device features a tower, a centrifugal separator with a rotating outer cylinder at the bottom of the tower, an inner cylinder consisting of a separation chamber and a screw, a cyclone with a gas duct extending from its top to the bottom of the tower, and a water tank. Waste gases are introduced from the top of the tower where they are forced to contact water sprayed from a nozzle. Supernatant liquid in the separation chamber is reused while solids are removed. The resulting gases are led to the cyclone where water vapors are separated and clean gases are released.

49563 **APTIC NO. 71770**

Nakada, Masahiko and Hirofumi Matsumoto

EXHAUST GAS CLEANING DEVICE. *(Haiki gasu joka sochi). Text in Japanese. (Toyota Automobile Industrial Co., Ltd., Toyota-shi (Japan)) Japan. Pat. Sho 50-1648. 6p., Jan. 20, 1975. (Appl. Feb. 24, 1971, 1 claim).*

An automotive exhaust gas cleaning device was designed for simultaneous reduction of carbon monoxide, hydrocarbons, and nitrogen oxides as well as reduction in fuel consumption without deteriorating the maximum power of the engine and the driving condition of the vehicle. In this device, a secondary air supply pipe with temperature controlled valve and air flow regulator valve is connected to the intake manifold. In the branch pipe extended from the position between two valves in the secondary air supply pipe, the first and second orifices are placed. The upper end of the second orifice is connected to the diaphragm chamber of the vacuum advancer of the distributor, while the lower end is connected to the vacuum port of the carburetor. During idling, after warming of the engine and driving with partial load, a suitable amount of secondary air is injected into the intake manifold to increase the air-fuel ratio for the reduction of CO and HC emissions, and simultaneously the vacuum advance of the distributor is decreased for the reduction of NOx and HC emission.

49564 **APTIC NO. 72048**

Oguri, Takeharu and Shigeo Aono

DETERMINATION METHOD OF RECIRCULATION EFFICIENCY IN EXHAUST GASES. *(Haiki kanryu ritsu sokutei hoho). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama-Shi (Japan)) Japan. Pat. Sho 50-2770. 7p., Jan. 29, 1975. (Appl. April 28, 1971, 2 claims).*

A method for determining the exhaust recirculation ratio by analyzing the carbon dioxide concentrations in exhaust gas and inlet air was developed. Exhaust gas was recycled into an air inlet tube depending on the engine rotation rate and engine negative pressure. Carbon dioxide concentration in the emitted exhaust as well as the pressure and temperature were measured after cooling. Carbon dioxide concentration in the inlet air was also measured after passing through a cooler and two filter dampers. The recirculation ratio was determined from the outputs of the analyzers as a ratio of the CO2 in inlet air to the CO2 concentration difference between exhaust and inlet air. The method also features the linearization of the nonlinearity of the outputs of the above analyzers in A/D and D/A transformations.

49565 **APTIC NO. 72217**

Ohuchi, Hideo, Ken ichi Sano, Yuichi Horio, Hyogoro Aoyama, Akihiko Oi, Seiichi Nakamura, Masaomi Suzuki, and Noomi Yamaki

DETERIORATION OF AN OXIDATION CATALYST FOR AUTOMOTIVE ENXHAUST EMISSION CONTROL. *(Jidosha haigasu joka shokubai no rekka). Text in Japanese. Sekiyu Gakkai Shi (J. Japan. Petroleum Inst. (Tokyo)), 18(3):29-34, March 1975. 26 refs.*

Durability tests of bead-type platinum oxidation catalysts were conducted to develop a catalytic converter for automobile exhaust. Examination of a fresh catalyst, a used catalyst, a heat treated catalyst, and a lead treated catalyst revealed that catalyst deterioration with increasing mileage (dynamometer tests) occurs at the catalyst surface and is due to physical attrition, thermal alteration, and catalyst poisoning. The carbon monoxide activity of the catalyst was recovered to a level equivalent to that of a fresh catalyst by heating the used catalyst to 800 C for 3 hr. The regeneration was attributed to the recovery of the original platinum active sites by elimination of sulfur and to the formation of new active sites as a result of the interaction of platinum and lead. The hydrocarbon oxidation activity of the catalyst was not recoverable due to the irreversible poisoning effect of lead.

49566 **APTIC NO. 72047**

Onoda, Mutsuo and Yasuo Nakajima

RECYCLING CLEANING APPARATUS FOR EXHAUST GASES IN INTERNAL COMBUSTION ENGINE. *(Nainen kikan no kanryu haiki joka sochi). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama-Shi (Japan)) Japan. Pat. Sho 50-2769. 3p., Jan. 29, 1975. (Appl. April 2, 1971, 2 claims).*

A cleaning apparatus for recycling exhaust from internal combustion engines by using a filter of heat-proof element covered with oxidizing agents is described. The filter is prepared by covering particles of heat-proof substances such as ceramics, alumina, etc., with platinum, palladium, copper oxide, or chromium oxide followed by sintering, which results in a porous material with good permeability. Carbon in the recycled exhaust gas is captured by the filter element and carbon monoxide is oxidized by the oxidizing agent when passing through it. The resulting heat of reaction causes combustion of the carbon captured in the filter element. The device can also be used by introducing air to the recycled exhaust before entering the filter.

49567 **APTIC NO. 71965**

Pasztor, Laszlo, Joseph G. Selmeczi, and Carl Labovitz

STACK GAS DESULFURIZATION RESIDUE MANAGEMENT. *Preprint, 20p., 1975. 7 refs. (Presented at the Management and Disposal of Residues from Treatment of Industrial Wastewaters, National Conference, Washington, D. C., Feb. 3-5, 1975.)*

A method for the chemical fixation, stabilization, and hardening of lime and limestone sulfur dioxide scrubbing sludges is described. The stabilizing agent used is Calcilox which is added in an amount of about 5% of the solid content of the sludge. Flue gas desulfurization calcium sulfite-sulfate sludges can be hardened and stabilized in 8-30 days with 3-10% of Calcilox. The speed and degree of stabilization increases with increasing Calcilox additions and increasing original solids content of the sludges. Two different disposal systems for the sludges are presently being used or developed. In one system, the sludge from a settling tank underflow with a 35% or greater solid content is mixed with 20% calcilox slurry and pumped into stabilization ponds where the sludge hardens. Subsequently, the hardened sludge is hauled to a disposal site. The second disposal method again mixes the settling tank underflow with Calcilox, but the Calcilox is added to the sludge in a powder form, with the mixture being pumped directly to its final disposal site (e.g., a ravine). Aside from the land reclamation application of the latter method, other possibilities involving the useful application of the treated sludge include: the pumping of Calcilox-sludge mixtures into underground coal mines to fill up cavities and the mixing of Calcilox-stabilized sludges with municipal sludges for conversion into fertile soil.

49568 **APTIC NO. 72203**

Paul, John E.

APPLICATION OF ELECTROSTATIC PRECIPITATORS FOR THE CONTROL OF FUMES FROM LOW ODOR PULP MILL RECOVERY BOILERS. *J. Air Pollution Control Assoc., 25(2):158-162, Feb. 1975. 4 refs.*

The design and application of electrostatic precipitators for the control of fumes and fine dusts from low odor kraft pulp mill recovery boilers is reviewed. Such precipitators are designed with freely suspended collection electrode plates and rigid charging electrode elements so that during the rapping process the elements will not shift their position relative to the collection plates. The series electrical sectionalization and treatment length is increased to give a minimum collector plate height-to-length aspect ratio of 1:1. This prevents reentrained particles from escaping the precipitator. The treatment zone is designed for maximum uniform gas velocity distribution to hold particle reentrainment to an absolute minimum. The precipitator hopper is designed with a flat bottom to prevent dust buildup that normally occurs on the slopping sides of a traditional precipitator. The capital cost of a 99.5% efficient electrostatic precipitator system for application to a low odor recovery boiler ranges between $5.50 and $6.50/acfm erected, approximately 30% higher than the cost of a conventional electrostatic precipitator system.

49569 **APTIC NO. 72196**

Penney, Gaylor W.

ADHESIVE BEHAVIOR OF DUST IN ELECTROSTATIC PRECIPITATION. *J. Air Pollution Control Assoc., 25(2):113-117, Feb. 1975.*

The adhesive behavior of dust in electrostatic precipitation is discussed. In two-stage precipitators particles are driven to the collecting plates by electrostatic forces; however, when the electrostatic force reverses and tends to pull the particles off, dust is held on the collecting electrodes solely by adhesion. In Cottrell or single-stage precipitators the corona current is capable of providing a significant force for holding the collected dust to the electrode provided that the dust resistivity is 10 to 10 ohm/cm or more; adhesion, however, is still essential in the collection of lower resistivity dust and is of vital importance in the transfer of dust from the collecting electrodes to the hopper. As the dust falls from the plates to the hopper, it must be held in agglomerations or chunks. A better understanding of the adhesive behavior of dusts in electrostatic precipitation is required for improvements in the transfer of dust from the collecting electrodes to the hopper. (Author abstract modified)

49570 **APTIC NO. 72337**

Riedinger, Bruno

DEMETALLIZING, DE-ASPHALTING, AND DESULFURIZING OF DISTILLATION RESIDUES. *(Entmetallisieren, Entasphaltieren und Entschwefeln von Destillationsrueckstaenden). Text in German. Bitumen, Teere, Asphalte, Peche, 26(1/2:9-22, 1975. 27 refs.*

Problems and achievements in the area of the desulfurization of distillation residues are described. The ever-increasing requirements of environmental protection will call for the desulfurization even of heavy fuel oils to sulfur contents of not higher than 1% in the foreseeable future. Currently, such desulfurization is only possible by hydration under pressure in the presence of catalysts which, however, are rapidly poisoned by metals, especially nickel and vanadium, when they are present in the oil in concentrations above 100 ppm. As these metals are associated with asphaltenes, both the metals and the asphaltenes have to be removed, which is currently possible by lightweight hydrocarbons in analogy to the propane deasphalting by precipitating agents. The heaviest components obtained as residues may account for 10 to 30% of the input, and can be used in bitumen. Wet natural gas burnt off in high torches in oil fields could be used for desulfurization of crude and heavy fuel oil.

49571 **APTIC NO. 71813**

Riemann, U. and B. Missfeld

ODORS IN WASTE AIR FROM SHEDS - HOW CAN THEY BE AVOIDED? *(Gerueche aus der Stallabluft - wie kann man sie vermindern)? Text in German. Landtechnik, 30(1):32-37, 1975.*

Possibilities to abate or avoid malodorous emissions from sheds in zootechnical facilities are described. Compliance with general hygienic requirements, regular cleaning, the use of litter, and the allowance of an optimum space requirement of 4 cu m per pig in cowsheds are essential for odor control. Adequate air circulation, and release of spent air at great height above floor level are important. whenever possible, spent air should be released into the atmosphere through shafts with their opening being at least 1.5 m higher than the ridge of the roof. The discharge speed can be increased by the use of injectors and other devices to facilitate dispersion.

49572 **APTIC NO. 72277**

Sato, Kazuichi

WASTE GAS CLEANING APPARATUS. *(Hai gasu seijo sochi). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 50-187. 3p., Jan. 7, 1975. 3 refs. (Appl. April 30, 1965).*

A waste gas cleaning apparatus which consists of three cleaning towers for alkaline solution, acid solution, and water washings is described. Each tower has an identical structure except for the use of different washing solution. The waste gas enters from the bottom of the tower and exits from the top. Several solution atomizers are placed at the middle part of each tower for washing the gas, and the washed gas enters into a vanadium oxide bed by passing through a demister. The gas treated by the first cleaning tower enters into the second tower with a different spraying solution and later into the third tower from which the treated gas is discharged into the atmosphere. The use of vanadium oxide as the bed material is advantageous in the following respects; it is cheap compared to other metal catalysts, it is not poisoned by many substances, it remains active for a relatively long period, and it shows activity even at room temperature. The three step cleaning apparatus is also effective in deodorization of flue gases.

49573 **APTIC NO. 72359**

Satori, Hideo, Haruo Uchiyama, and Mikio Kiyose

APPARATUS TO PREVENT GAS FLOWING INTO HOPPER OF ELECTROSTATIC PRECIPITATOR. *(Denki shujinki ni okeru hopper nai eno gasu ryunyo boshi sochi). Text in Japanese. (Ishikawajima Harima Heavy Industry Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-2602. 2p., Jan. 23, 1975. (Appl. April 27, 1970).*

A device to prevent the updraft of precipitated dusts in the hopper of electrostatic precipitators is described. The prevention is achieved by installing several baffle plates under the electrode plates. All of the baffle plates are tilted toward the bottom center of the hopper.

49574 **APTIC NO. 72377**

Schaaf, Hanno and Horst Zapf

THE NATURAL GAS ENGINE AS A LOW POLLUTION POWER SYSTEM FOR COMMERCIAL VEHICLES. *(Der Erdgasmotor als umweltfreundlicher Nutzfahrzeugantrieb). Text in German. Automobiltech. Z. (Stuttgart), 77(3):67-72, 1975. 6 refs.*

The major advantage of the spark-ignition natural gas engine over the diesel engine is the fact that its exhaust gas is free from soot or smoke and odor. The natural gas engine will be able to meet all future requirements with regard to emission of nitric oxide, carbon monoxide, and hydrocarbons. For this purpose, no auxiliary equipment is required--it is merely necessary to optimize the engine and operating parameters combustion air ratio, compression ratio, and ignition point. The correlation between engine output, specific fuel consumption, combustion air ratio, ignition point, and NO emission were determined. According to these determinations, it is advisable to operate the engine at a compression ratio as high as possible and at a late ignition point. The limits to the increase in the compression ratio are set by the ignition systems available today. According to the USA-13-mode cycle for commercial vehicles with diesel engines, the sum of NO and unburned HC is 3.8 g/BHP hr and that of CO is 1.5 g/BHP hr, at a compression ratio of 14 and an ignition point of 2 deg of crank angle before TDC.

CONTROL METHODS

49575 **APTIC NO. 72378**

Schreiber, Erich and Rainer Cichocki

DEVELOPMENT OF LOW EMISSION HIGHWAY DIESEL ENGINES. *(Der Entwicklungsstand schadstoffarmer Fahrzeug-Diesel motoren). Text in German. Automobiltech. Z. (Stuttgart), 77(3):82-84, 1975. 1 ref.*

The characteristics of an Anstalt fuer Verbrennungsmotoren naturally aspirated L-6 cylinder engine are plotted over the 13-mode cycle emissions at various injection timings. The smoke levels are absolutely low and almost independent of the injection timing. This has been achieved by means of a specially shaped intake port, as well as by a most careful matching of the decisive injection and combustion system parameters. The 13-mode emission level of the engine s optimum performance version is as low as 8 g/BHP-hr. By simply retarding the injection timing, a 4.5 g/BHP-hr low emission engine version is obtained, with the only sacrifice a 6% loss in power and fuel economy compared with the optimum performance version. However, the substantially lower combustion pressures of the low emission version, going hand in hand with the lowered thermal load of engine components, disclose new advantageous aspects with regard to engine service life, power to weight ratio, and combustion noise. Accordingly, even a conversion of heavy duty gasoline engines into direct injection diesel engines could become a practical solution. Turbocharging aggravates the complexity of interrelated parameters.

49576 **APTIC NO. 71818**

Schwanecke, R.

REDUCTION OF HYDROCARBON LOSSES FROM TANKS. *(Verminderung von Kohlenwasserstoffverlusten aus Tankanlagen). Text in German. Wasser Luft Betrieb, 19(1):14-18, 1975.*

Modern methods for the reduction of hydrocarbon losses from tanks are described. Floating roof tanks have edge seals in the form of oil- or polyurethane foam-filled plastic bags to minimize losses. The formation of hydrocarbon vapors can also be avoided by the use of a flexible plastic membrane as a diaphragm roof. Hydrocarbon vapors collected from tanks or displaced into filling tanks from tanks during filling can be recovered in an inexpensive process by saturation with gasoline vapors, cooling, and absorption with gasoline. Activated carbon is used sometimes for the retention of hydrocarbon vapors. Hydrocarbon vapor recovery is most efficient in central tank fields, petroleum refineries, and chemical plants.

49577 **APTIC NO. 72046**

Seki, Michiharu

EXHAUST GAS TREATMENT TECHNIQUE. *(Haigasu shori hoho). Text in Japanese. (Hitachi Manufacturing Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-2391. 5p., Jan. 25, 1975. (Appl. Oct. 23, 1972, 2 claims).*

An invention for the removal of sulfur oxides and nitrogen oxides in exhaust gas is described. Two continuous adsorbing towers were packed with activated carbon and activated carbon in the first tower was impregnated with at least one of the following substances including bromine, iodine, chlorine, and their ammonium salts. Exhaust gases containing SOx and NOx were introduced into the first tower where they were converted into ammonium salts. The resulting gases were then led to the second tower where the remaining halogen gases were removed by activated carbon. When the resulting gases from the first tower contain high halogen concentration, an indication of slowdown of the adsorption, the exhaust gases are switched to the second tower where halogen gas is also introduced and the activated carbon of the first adsorbing tower is regenerated by washing or by other means. The method can be carried out by using three continuous towers for continuous operation and regeneration.

49578 **APTIC NO. 71781**

Sercombe, E. J.

EXHAUST PURIFIERS FOR COMPRESSION IGNITION ENGINES. CATALYTIC CONTROL OF DIESEL EXHAUST GASES. *Platinum Metals Rev., 19(1):2-11, Jan. 1975. 5 refs.*

A platinum oxidation catalyst, known as the Honeycat Diesel Exhaust Purifier, was tested on a dynamometer-mounted diesel engine with direct injection operating over the California Air Resources Board 13-mode cycle. Brake specific hydrocarbon emissions were reduced from 2.52 to 0.78 g/brake horsepower/hr and carbon monoxide emissions were reduced from 6.8 to 0.7 g/brake horsepower/hr. The catalyst was also effective in reducing diesel odor emissions at engine operating temperatures over 200 C. Nitrogen oxide emissions were unchanged. Use of the catalyst in combination with a 12 degree retard in injection timing, however, resulted in a reduction of nitrogen dioxide emissions from 10.5 (before retard) to 4.6 g/brake horsepower/hr, while hydrocarbon and carbon monoxide emissions were maintained at levels of 2.3 and 1.4 g/brake horsepower/hr.

49579 **APTIC NO. 72312**

Sercombe, Eric J.

NOBLE METAL CATALYSTS FOR NON-SELECTIVE OXIDATION AND POLLUTION CONTROL. *Chem. Ind. (London), no. 4:157-161, Feb. 15, 1975. 9 refs.*

The application of noble metal catalysts for air pollution control is reviewed. Applications covered include: the control of solvent vapors from paint drying operations, fume control in wire enamelling operations, the control of odorous sulfur compounds from animal rendering processes and the like, and the control of hydrocarbon, carbon monoxide, and nitrogen oxide emissions from motor vehicles. Theoretically, 100% conversion can be obtained with catalysts used to control such pollutants, and very large volumes of air can be treated economically. A two-stage oxidation-reduction catalyst system is cited as the simplest way of currently meeting 1977 emission standards for automobiles. Ruthenium based catalysts used for NOx reduction also show oxidation properties; and , if exhaust gas composition is accurately controlled, it is possible to operate a single bed system for the simultaneous oxidation of hydrocarbons and CO and the reduction of NOx.

49580 **APTIC NO. 72261**

Shibano, Kenji

EXHAUST GAS CIRCULATION APPARATUS. *(Haiki gasu junkan sochi). Text in Japanese. (Fuji Heavy Industry Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-734. 3p., Jan. 10, 1975. 1 ref. (Appl. May 21, 1970).*

An exhaust gas recirculation apparatus is described. An exhaust gas recirculation tube is connected between the exhaust pipe and the intake tube and the opening of the tube; the amount of recirculated gas is regulated by a piston-type cycle control valve which is connected to the throttle valve of the carburetor through an arm. The arm is designed in a two-step linkage so that the cycle valve closes the recirculation tube when the throttle valve is at a fully opened angle and a small angle. Therefore, no exhaust gas recirculation occurs when the automobile is in full power, idling, or low running conditions. This prevents lowered engine power at these conditions.

49581 **APTIC NO. 71722**

Shigemori, M. and N. Eguchi

EXHAUST GAS RECIRCULATION APPARATUS FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan no haiki junkan sochi). Text in Japanese. (Hino Automobile Industrial Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-211. 3p., Jan. 7, 1975. 3 refs. (Appl. Dec. 22, 1970, 1 claim).*

An exhaust gas recirculation device to reduce nitrogen oxides emission from internal combustion engines is described. The recirculation is achieved by employing a tube connecting between the exhaust pipe and intake tube. A throttle valve is installed within the exhaust pipe between the muffler and recirculation tube, and regulated by exhaust gas temperature. Whenever the gas temperature is high, the valve closes and increases the gas flow to the intake tube. A temperature senser is installed within the exhaust pipe and controls a solenoid or magnetic air valve linking to the throttle valve through a relay. The recirculation tube can be cooled by a fan to improve the engine power.

49582 **APTIC NO. 72032**

Shimizu, Takeo

CLEANING APPARATUS FOR EXHAUST GASES IN COLD CONDITION OF INTERNAL COMBUSTION ENGINE. *(Nainen kikan no reitai shido chokugo haiki gasu joka sochi). Text in Japanese. (Mitsubishi Automobile Industrial Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-2773. 3p. Jan. 29, 1975. (Appl. April 8, 1971, 1 claim).*

An exhaust gas cleaning device for internal combustion engines was designed to reduce carbon monoxide and hydrocarbon concentration in the exhaust gas. The device features a small LPG (liquefied petroleum gas) bomb, a solenoidal valve, a regulator, gas pipe extending from the bomb through the valve to the regulator, a hose connecting the regulator and carburetor, a cleaning apparatus including a catalytic converter and a reactor, an air pump which supplies secondary air to the reactor, and a sensing system which controls the switch for the gasoline tank and the solenoidal valve. During cold starting, the temperature of the cleaning apparatus is low so that only LPG is introduced to the carburetor. When the temperature is high, LPG is stopped and gasoline is introduced.

49583 **APTIC NO. 72311**

Smith, Wallace B. and Jack R. McDonald

CALCULATION OF THE CHARGING RATE OF FINE PARTICLES BY UNIPOLAR IONS. *J. Air Pollution Control Assoc., 25(2):168-176, Feb. 1975. 8 refs.*

An equation for the calculation of the charging rate of fine particles by unipolar ions is developed and related to electrostatic precipitation efficiency. The equation is based on kinetic theory and evaluates the charging rate in terms of the probability of collisions between the dust particles and ions. In the presence of an external electric field, the particle surface is divided into three charging regions, and separate charging rates are calculated for each region. The total charging rate is the sum of these three individual rates. The theory predicts the same charging rate as the classical field charging equation of Rohmann and Pauthenier for large particles and high electric fields, while for low electric fields the theory reduces to White s diffusional charging equation. Agreement is within 25% of experimental results where data are available and within 15% for practical charging times. (Author abstract modified)

49584 **APTIC NO. 72308**

Snavely, Earl S., Jr. and Ted A. Bertness

REMOVAL OF SULFUR DIOXIDE EMISSIONS BY SCRUBBING WITH OILFIELD- PRODUCED WATER. *J. Petrol. Technol., 1975:227-232, Feb. 1975. (Presented at the Society of Petroleum Engineers - American Institute of Mining Engineers, Annual Fall Meeting, 48th, Las Vegas Nev., Sept. 30-Oct. 3, 1973, Paper SPE 4661.)*

Laboratory and field tests were performed to investigate the feasibility of removing sulfur dioxide from steam generator flue gases by scrubbing with alkaline water produced at an oilfield. Sulfur dioxide removal efficiencies as high as 96% were obtained in field trials on steam generators fired with high-sulfur crude oil. Nitrogen oxides were also removed to some extent (9-21% collection). A packed column used in initial trials required frequent cleaning, and replacement of the packing with slot trays resulted in reduced pressure drop without any sacrifice in collection results.

49585 **APTIC NO. 72049**

Tabata, N. and M. Mori

AIR CLEANING APPARATUS. *(KuKi joka sochi). Text in Japanese. (Mitsukishi Electrical Machinery Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-1940. 3p., Jan. 22, 1975. 1 ref. (Appl. June 2, 1969, 1 claim).*

A cleaning apparatus for air containing harmful and odorous gases is described. The apparatus features a discharger, an adsorption filter of activated carbon or activated alumina, a permeable earth electrode, and insulator plates with holes. High voltage was applied to the discharger, which caused discharge between the discharger and the adsorption filter. Air containing harmful gases was introduced through the holes of the insulated plate and passed through the filter. The harmful and odorous gases were adsorbed on the filter where they were decomposed. Dust in the air must be removed prior to the above treatment.

49586 **APTIC NO. 72314**

Tassicker, Owen J.

SOME ASPECTS OF ELECTROSTATIC PRECIPITATOR RESEARCH IN AUSTRALIA. *J. Air Pollution Control Assoc., 25(2):122-128, Feb. 1975. 19 refs.*

Australian research and development into electrostatic precipitator performance is reviewed in terms of bench-scale, pilot, and field tests investigating factors affecting the collection efficiency of high resistivity fly ash generated from the burning of low sulfur coals. Areas being researched include: resistivity and corona parameters for fly ash in both the bone-dry and gas-conditioned mode, the determination of the complex dielectric constant for several species of dust, the effect of dust adhesivity of electrostatic collection, precipitator electrode evaluation, and gas conditioning. Back ionization appears to be mitigated by both gas-conditioning and special energization.

49587 **APTIC NO. 72024**

Tsunamoto, Kamenosuke

PREPARATION METHOD OF AIR FILTER FOR DEODORIZATION. *(Dasshu-yo ea firuta no seizoho). Text in Japanese. (Nihon Kasei Co., Ltd., Nishinomiya (Japan)) Japan. Pat. Sho 50-301. 2p., Jan. 8, 1975. (Appl. Dec. 17, 1969, 2 claims).*

An adsorption deodorization air filter coated with deodorizing resin with amphoteric functional groups was prepared. The resin component mixture is coated readily and evenly onto non- woven filter of synthetic fibers at room temperature and heated for the formation of condensation product with amphoteric functional groups. To an acidic solution of m-phenylenediamine or a mixture consisting of m-phenylenediamine and phenol or resolucine, formaldehyde is added. Or, to and acidic solution of p-aminophenol, paraformaldehyde is added. The mixture obtained is coated onto a non-woven filter of synthetic fibers and heated at 90-110 C for several hrs, producing insoluble condensation product. The filter coated with condensation product is washed with water, dried, and used. The resin produced contains amino groups and aromatic hydroxyl groups which are effective for the efficient adsorption of acidic gases (organic acid, hydrogen sulfide) and basic gases (ammonia, amines). The filter obtained is resistant to acid and base, and no increase in ventilation resistance is observed.

49588 **APTIC NO. 72076**

Villa, Sergio

SO2 REMOVAL FROM STACK GAS. *Processing, 1975:37-38, Feb. 1975. 1 ref.*

An improved alkali-sulfite and bisulfite process for removal of sulfur dioxide from stack gases was developed. The system is regenerated by using gases that behave as inert gases towards the solution, such as nitrogen, carbon dioxide, and waste gases. The first industrial application was made in 1972 at the Societa Chimica Dauna Plant in Manfredonia where 90,000 n cu m/hr of gas with an SO2 content of about 0.2 vol% is scrubbed. The SO2 concentration in the vented gases is about 20-30 ppm, which is well under the projected values of 50 ppm. There is practically no fog formation with this system. The by-product, ammonium sulfate, is marketable.

49589 **APTIC NO. 71923**

Weaver, Paul H.

BEHIND THE GREAT SCRUBBER FRACAS. *Fortune, 1975:106-110, 112, 114, Feb. 1975.*

A review of the controversy between the Environmental Protection Agency and electric power companies concerning the use of scrubbers for stack gas sulfur dioxide control is presented. The effectiveness of scrubbing techniques is questioned in terms of their present reliability, the resulting increase in fuel costs, the disposal of large amounts of scrubber sludge, and rapidly emerging techniques of fuel desulfurization which may be commercially available and more economical than scrubbing by the mid-1980 s. Other alternatives to sulfur dioxide control such as dispersion with tall stacks and the use of low-sulfur fuels are also examined. The relationship of sulfur dioxide pollution to human health is discussed and compared to that for combinations of sulfate particulates and mists of sulfurous and sulfuric acid which arise when sulfur dioxide combines with water and oxygen in the atmosphere. Studies are cited showing that some scrubbers create and emit acid mists and sulfates which may be more harmful to human health than sulfur dioxide.

49590 **APTIC NO. 72315**

White, Harry J.

ROLE OF ELECTROSTATIC PRECIPITATORS IN PARTICULATE CONTROL: A RETROSPECTIVE AND PROSPECTIVE VIEW. *J. Air Pollution Control Assoc., 25(2):102-107, Feb. 1975. 15 refs.*

The growth, applications, technology, problem areas, and future outlook of electrostatic precipitation as the major instrument for the high efficiency control of fine particulate emissions from heavy industry is reviewed. Data are presented for major industrial precipitator installations between 1907 and 1970, the growth in total and fly ash precipitation capacity since 1950, efficiency trends for fly ash, cement kiln, and paper precipitators, annual sales of precipitators in the United States, basic design parameters in practice for fly ash precipitators, and the effect of sodium content on fly ash resistivity. Also included are design factors which should be included in precipitator specification and evaluation and commonly encountered precipitator problems. The ability of electrostatic precipitators to economically remove fine particles in the micron and submicron range and thus meet the newer air pollution control objectives is projected to result in the continued growth of this type of particulate control technology.

49591 **APTIC NO. 72029**

Yanagisawa, Keizo

EXHAUST GAS CLEANING DEVICE FOR AUTOMOBILE WITH AUTOMATIC TRANSMISSION. *(Jido hensokuki ni okeru haiki gasu joka sochi). Text in Japanese. (Toyo Industrial Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 50-215. 3p., Jan. 7, 1975 (Appl. Dec. 21, 1970, 1 claim).*

The carbon monoxide and hydrocarbon concentrations in automotive exhaust gas are increased particularly during idling and coasting due to the decrease in engine speed. In the case of an automatic transmission, the idling engine speed in the N range is higher than that of the D and R ranges due to the difference in resistance torque. If the idling engine speed in the D and R ranges is increased for the purpose of reducing pollutant emission, the transmission shock at the time of switching the select lever is increased. In this device, the idling engine speed in the D and R ranges can be increased, while maintaining the idling engine speed in the N range at the highest allowable level. In the idling adjustor, the hydraulic actuator is placed in position with a contact rod connected to the operating lever of the carburetor throttle cam. In the N range, the abovementioned contact rod is separated from the hydraulic actuator allowing the free operation of throttle cam. In the D and R ranges, however, the hydraulic actuator is in operation, thereby moving the throttle cam from the closed position for allowing a slight opening of the throttle valve, which results in an increase in engine speed.

49592 **APTIC NO. 71764**

Yoshimura, S.

AIR INTAKE APPARATUS FOR ENGINE. *(Engin no kyuki sochi). Text in Japanese. (Toko Industrial Co., Ltd., Hiroshima (Japan)) Japan. Model Util. Sho 50-737. 2p., Jan. 10, 1975. 1 ref. (Appl. May 27, 1970).*

Engines equipped with thermal reactors for auto exhaust gas treatment ignite the unburned fuel mixture when the ignition is off, causing moisy afterburnings. A device to prevent such afterburning is described. A bypassing air line to connect directly between the air cleaner and engine intake portion is installed. A solenoid valve is placed in this air line and closes the line while the ignition is on. When the ignition is off, it opens the solenoid valve allowing air to flow through the line, and an air-rich fuel mixture results within the combustion chambers. This mixture cannot be ignited in the thermal reactor, therefore preventing afterburning.

49593 **APTIC NO. 72045**

Yoshimura, S. and M. Kitamura

STARTING APPARATUS IN INTERNAL COMBUSTION ENGINE. *(Nainen kikan no shido sochi). Text in Japanese. (Toyo Industrial Co., Ltd., Japan) Japan. Pat. Sho 50-2776. 3p., Jan. 29, 1975. (Appl. March, 18, 1971, 1 claim).*

A newly designed starting system in an internal combustion engine with carburetor aims at the prevention of emission of unburned substances at times of starting. The device features a detecting switch which monitors the cranking rotation number, and an electromagnetic valve connecting the switch and the fuel path from a float chamber. When the cranking rotation number reaches to a level at which complete combustion of the mixed gas occurs, the detecting switch opens the fuel path through the electromagnetic valve. Fuel supply is stopped when the rotation number indicates an incomplete combustion.

49594 **APTIC NO. 72053**

Yukimori, Takao, Yasuo Abeyama, and Hiroshi Wada

REMOVAL TECHNIQUE FOR MERCURY VAPOR IN HYDROGEN GAS. *(Suiso gasu-chu no suigin joki jokkyoho). Text in Japanese. (Osaka Hydrogen Industrial Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 50-1477. 4p., Jan. 18, 1975. (Appl. Dec. 11, 1970, 1 claim).*

A low-cost and efficient removal method for mercury vapor contained in hydrogen gas (10-30 mg/cu m at 20-30 C) obtained as an electrolysis by-product of saline solution by the mercury method was developed. The granules (mm order) of one or more than two types of metal sulfides selected from copper, iron and nickel sulfides, or one or more than two types of metal sulfides selected from copper, iron and nickel sulfides contained, adhered or adsorbed onto carrier such as silica gel, silica alumina, alumina, diatomaceous earth or molecular sieves were used as adsorbents. The H gas containing Hg was passed through reaction tower packed with adsorbent at the rate of less than 800 l/hr per liter of adsorbent under atmospheric or applied pressure. After passing H gas containing 2.4 mg/cu m of Hg through various adsorbents prepared, the Hg content in purified H gas was undetectable at 0.001 mg/cu m levels in all cases.

49595 **APTIC NO. 71884**

Environmental Protection Agency, Research Triangle Park, N. C., Technology Assessment and Evaluation Branch

THE PETRO ELECTRIC MOTORS HYBRID VEHICLE (FEDERAL CLEAN CAR INCENTIVE PROGRAM CANDIDATE VEHICLE). *Preprint, 23p., Jan. 1975.*

Fuel economy and emissions tests were conducted by the Environmental Protection Agency on a Petro Electric Motors internal combustion engine/battery hydrid system installed in a 1972 Buick Skylark. The original internal combustion engine was replaced by the PEM hybrid system consisting of a 70 cu in. Mazda rotary engine and thermal reactor, electric dynamotor, and speed control circuits. Three phases of separate testing (Federal Test Procedure and EPA Highway Cycle) were performed at different times, and the vehicle demonstrated exhaust emission levels of 0.41, 3.4, and 1.0 g/mi for hydrocarbons, carbon monoxide, and nitrogen oxides, respectively, during 40 mi of testing in its last test configuration. A deterioration factor was not established. The vehicle cannot be driven by an inexperienced driver over an arbitrary route since there are no automatic provisions for battery control.

49596 **APTIC NO. 71885**

Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab.

THE EPA-VAN. *Preprint, 3p., 1975 (?).*

An energy-saving, pollution-free, home energy system installed in an Environmental Protection Agency mobile research van is described. The system is composed of solar energy collectors, fuel cells, a heat pump system, catalytic appliances, and an energy storage system to provide all the energy needed for heating, cooling, lighting, cooking, and hot water heating. The primary source of heat is the energy absorbed by solar collectors which in turn is used to heat water. The energy in the heated water is used directly for room heating or is stored as heat for later use. The stored energy is extracted from the water by a heat pump. The latter also utilizes the outside air as a heat source. All electricity for the EPA van is produced by two fuel cells which electrochemically combine a gaseous fuel and air to produce electricity, clean water, and heat that is utilized in the winter for room heating. The appliances are equipped with catalytic burners; the only by-product of the latter is water.

49597 **APTIC NO. 71919**

Office of Air and Waste Management, Ann Arbor, Mich., Technology Assessment and Evaluation Branch

A SECOND EVALUATION OF THE YAMAHA LEAN COMBUSTION ENGINE SYSTEM. *Preprint, 7p., Feb. 1975.*

Fuel economy and exhaust emissions tests were conducted on a Toyota Corolla equipped with a Yamaha lead combustion spark- ignition engine system. The lean combustion system includes a number of modifications to the carburetor, intake manifold, and cylinder head to improve the quality of the fuel-air mixture and the distribution of the mixture. Analysis of the exhaust emissions over the 1975 Federal Test Procedure, the Environmental Protection Agency Highway Cycle, and the steady state emissions test revealed that the Yamaha test car achieved 1977 Federal emissions standards of 0.41 g/mi for hydrocarbons, 3.4 g/mi for carbon monoxide, and 2.0 g/mi for nitrogen oxides. The vehicle also met the 1978 California standards. Fuel economy averaged 23.6 mi/gal over the 1975 Federal Test Procedure and 36.3 mi/gal over the EPA Highway Cycle.

49598 **APTIC NO. 72014**

California Coastal Zone Conservation Commission, San Francisco

ENERGY ELEMENT FINDINGS AND POLICIES: 59. METHANOL; 60. ENERGY STORAGE TECHNIQUES AND APPLICATIONS; 10. ENCOURAGE CONSIDERATIONS OF ALTERNATIVE ENERGY SOURCES AND ENERGY SELF- SUFFICIENT DEVELOPMENT (EXCERPTS FROM THE REVISED DRAFT OF THE SIXTH PLAN). *Preprint, p. 135-146, Jan. 4, 1975.*

The environmental effects of alternative energy sources for automobiles and electric power production are discussed. Up to 15% methanol can be added to commercial gasoline in cars now in use without having to modify the engine. The mixture results in higher octane ratings, reducing the need for lead and lower exhaust emissions. When methanol was burned in a full scale boiler, no particulates were released from the stack and the amount of nitrogen oxides and carbon monoxide was less than the amount emitted from natural gas and oil. There were no sulfur compounds, and the amount of aldehydes, acids, and unburned hydrocarbons were negligible. Fuel cells can produce electrical energy at higher efficiencies than conventional fossil fuel-fired power plants, and without the air pollution. Hydrogen is a fuel gas that can be burned directly with almost no air pollution and might used as a substitute for natural gas to fuel electric power generators and to power automobiles. A California policy was recommended to ensure adequate supplies of energy while minimizing the adverse environmental impact of conventiaonal energy production and which includes a tax incentive for using low or non-fossil fuel energy systems. Position statements were adopted on alternative energy sources and alternative energy resources.

49599 **APTIC NO. 72305**

STACK GAS SCRUBBER MAKES THE GRADE. *Chem. Eng. News, 1975:22-24, Jan. 27, 1975.*

The successful commercial operation of a wet limestone scrubber for the removal of sulfur dioxide from the gas stream of a 115 MW electric power generating unit is described. The scrubber installation removed 90% of the SO2 and was on stream 91.5% of the time for more than a year of operation. Packing in the scrubber tower is a specially corrugated polypropylene material selected for its high surface area and low pressure drop. Sulfur dioxide dissolves in the slurry and later reacts with the limestone. The net product of the flue gas treatment plant is a slurry containing up to 15% suspended particles by weight. The scrubbing process added 0.6 mill/KW hr to the operating costs, not including sludge removal. Capital investment for the scrubber was an estimated 2-3% of the total capital investment for the generating plant.

49600 **APTIC NO. 75097**

Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

REPORT TO CONGRESS ON CONTROL OF SULFUR OXIDES. *Rept. EPA-450/1-75-001, 67p., Feb. 1975. 7 refs.*

NTIS: PB 241021/AS

The compliance status of existing coal-fired steam electric power plants and alternative methods for compliance with applicable emission regulations are reviewed. Compliance alternatives considered include: the use of low-sulfur coal, physical coal desulfurization, flue gas desulfurization, coal gasification, fluidized-bed boilers, supplementary control systems, and heat recovery from solid waste. The current status of existing coal-fired plants is examined in terms of the sulfur content of coal purchased during the first half of 1974, the involvement of power companies in litigation challenging the applicable regulations, and the programs for achieving compliance with sulfur regulations in state implementation plans.

1974

49601 **APTIC NO. 71974**

Accortt, J. I., A. L. Plumley, and J. R. Martin

FINE PARTICULATE REMOVAL AND SO2 ABSORPTION WITH A TWO-STAGE WET SCRUBBER. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 144-160. 12 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

Results from pilot plant studies and early field demonstration studies of a limestone wet scrubbing process designed to remove fine particulates and sulfur dioxide generated from the burning of low sulfur sub-bituminous coal are presented. Based on data obtained from the prototype unit handling 12,000 CFM of gas with an inlet dust loading averaging 2.0 gr/SCF and a particle size distribution showing a substantial amount of fines (smaller than 1.5 micron), the limestone marble-bed scrubber collected only 96.10% of the total dust generated by the thermal power unit. With the addition of a first stage collection device gas atomizing type collector), overall removal efficiency was increased to as high as 99.20%. (Author conclusions modified)

49602 **APTIC NO. 72040**

Adachi, Takayoshi

IONIC WIND IN ELECTRICAL DUST PRECIPITATORS. *(Denki shujin sochi ni okeru ion-fu sayoryoku no eikyo). Text in Japanese. Hyomen (Surf.), 12(9):557-565, Sept. 1974. 24 refs.*

The dust collecting capacity of electrostatic precipitators is due to ionic wind, which includes positive, negative, secondary, and alternating ionic winds. These are formed by positive corona discharge, negative corona discharge, positive-negative collision, and corona discharge with an alternating current. Gas flows along the electrodes of the electrostatic precipitator while ionic wind flows in the vertical direction. The wind is either positive or negative, depending on the charge on the electrodes. A two stage electrostatic precipitator designed to clean the air inside the precipitator consists of a section in which gas particles are charged and another section in which dust is precipitated. Positive corona discharge is used in order to keep ozone formation to a minimum. The miniature tube type electrostatic precipitator is exceptional in that the gas current flows in the same direction as the ionic wind.

49603 **APTIC NO. 71637**

Allemann, R.

HEAT RECOVERY FROM THERMOSETTING, DRYING AND AIR CONDITIONING PROCESSES IN THE TEXTILE REFINING INDUSTRY. *(Waermerueckgewinnung bei Thermofixier-, Trocknungs- und Lueftungsprozessen in der Textilveredlungsindustrie). Text in German. Textilveredlung (Basel), 9(11):544-548, 1974.*

An estimation is made of the amount of energy wasted by blowing hot exhaust air from thermosetting, drying, and air conditioning systems into the atmsophere. The energy present in such exhausts may be recuperated by means of heat exchangers and put to use in systems requiring heat, which will substantially lower fuel consumption for air heating purposes. Problems related to the separation of exhaust air from fresh air to be heated, and to the high degree of pollution of exhaust air may be solved by the use of glass-plate heat exchangers. Calculations show that the use of such exchangers for heat recuperation in drying operations is economical and that investment costs will be amortized in a few months as a result of fuel savings.

49604 **APTIC NO. 68222**

Alperstein, M., G. H. Schafer, and F. J. Villforth, III.

TEXACO S STRATIFIED CHARGE ENGINE - MULTIFUEL, EFFICIENT, CLEAN, AND PRACTICAL. *Preprint, Society of Automotive Engineers, New York, 13p., 1974. 9 refs. (Presented at the Society of Automotive Engineers, Southern California Section, May 14, 1974, Paper 740563.)*

Fuel economy and exhaust emission results are presented for Texaco s stratified charge engine combustion concept, the Texaco Controlled-Combustion System (TCCS), which was tested on M-151 army vehicles, one having a naturally aspirated L-141 TCCS engine and the other having a turbocharged L-141 TCCS engine. The TCCS conversions result in inherently low exhaust emissions, multifuel capability, and improved fuel economy over the normally carburetted L-141 gasoline engine. Promulgated federal gaseous exhaust emission standards can be met with the naturally aspirated TCCS engine-powered M-151 vehicle equipped with exhaust gas recirculation and a Texaco-developed exhaust catalyst. Environmental Protection Agency test results for average hydrocarbon, carbon monoxide, and nitrogen oxide emissions from the naturally aspirated TCCS engine are 0.30, 0.67, and 0.34 gpm, respectively, after 50,000 miles. Average emissions of hydrocarbons, CO, and NOx for the turbocharged TCCS engine with full emission controls are 0.35, 1.41, and 0.35 gpm, respectively. Data are also provided for emissions under varying degrees of control.

49605 **APTIC NO. 71701**

Anderson, Clyde G.

CARBONATION SYSTEM FOR RECOVERY OF SODIUM BASE PULPING LIQUOR. *(Owens-Illinois, Inc., Toledo, Ohio) U. S. Pat. 3,826,710. 6p., July 30, 1974. 6 refs. (Appl. April 21, 1972, 2 claims).*

A process for recovering sodium based sulfite pulping liquor is described which, unlike prior-art techniques, precludes the release of hydrogen sulfide to the atmosphere. The green liquor is first contacted with a gaseous mixture of hydrogen sulfide and carbon dioxide in a preabsorption tower for the conversion of the liquor to a mixture of sodium hydrogen sulfide, sodium bicarbonate, and sodium carbonate. The latter mixture is then passed through a reaction tower countercurrent to a gas composed principally of carbon dioxide and nitrogen. The liquor is stripped of hydrogen sulfide in the reaction tower and also absorbs carbon dioxide such that it can be used to convert sodium bicarbonate to sodium carbonate. Most of the hydrogen sulfide in the precarbonation tower is selectively absorbed in that tower, leaving a gaseous mixture containing nitrogen and carbon dioxide which is then recylced for use in the reaction tower. By recycling these gases to the reaction tower, it is possible to avoid the release of any hydrogen sulfide to the atmosphere.

49606 **APTIC NO. 68120**

Anderson, J. G.

THE ENERGY DILEMMA. *Automotive De.. Eng., vol. 13:12-13, July/Aug. 1974. 4 refs.*

The need for energy conservation is tempering demands for automotive exhaust emission control. With the current need to maximize gasoline production, demands to tailor gasoline quality for emission controls should be reassessed. In the past, anti- knock quality of gasoline has been improved, the cost of producing high octane fuel has been justified in a reduction of cost/mile, and compression ratios that gave the best economy were used. A sensible balance between compression ratios and octane number was reached about a decade ago. If compression ratios are raised above 10:1, mechanical problems might arise and further improvements in gasoline quality will be impossible. Improved anti-knock quality and removal of lead could increase cost and reduce yield of gasoline. Generally, gasoline yield is inversely proportional to the amount of upgrading involved in the refinery process. Lead traps and cyclones could be used to remove lead emissions without decreasing gasoline yield. If lead is reduced to low levels or removed, both Research and Motor octane numbers will have to be reduced, or the cost will increase and gasoline yield will decrease. Compression ratios may have to be reduced to cope with lower octane, with adverse effects on economy. Engine design changes such as improved carburetion, better manifold design, and high compression ratios for high thermal efficiency can be used to remove carbon monoxide and hydrocarbons. Recirculation of exhaust to reduce nitrogen oxides is wasteful, and the use of thermal reactors should be avoided since it increases fuel consumption. Doubts about catalyst durability and safety and increased costs and fuel consumption occur with catalytic converters.

49607 **APTIC NO. 72067**

Anderson, Robert J.

DUST FILTER. *(The Andersons, Maumee, Ohio) U. S. Pat. 3,813,853. 18p., June 4, 1974. 9 refs. (Appl. Aug. 30, 1971, 7 claims).*

A bag-type dust collector is described that reduces re-entrainment and re-deposition of previously filtered dust to negligible amounts. Unlike prior-art devices, the filter bags are not shaken, expanded, or subjected to excessive forces during cleaning or filtering. The device also provides for a greater volume of gas at a given filter efficiency. The filter s housing is divided by a horizontal partition into an upper clean gas plenum and a lower contaminated gas plenum. Several vertical, parallel cells are circumferentially located in the lower plenum, with their upper ends opening through the partition into the clean gas plenum. The lower ends of the cells are closed, and each contains one or more filter bags which have closed tops and lower ends which open through the closed ends of the cells to the lower contaminated gas plenum. Two concentric, spaced conical hoppers are situated at the lower end of the housing and lead downwardly to a dust discharge mechanism. An exhaust duct equipped with a damper leads from the clean gas plenum to the atmosphere. A damper actuating device located in the contaminated gas plenum is responsive to the differential between the pressure in the contaminated gas plenum and the atmosphere for opening and closing the damper, thus maintaining a constant pressure in the contaminated gas plenum. A clean gas blast generator delivers a measured volume of clean gas to the bag or bags in a cell being cleaned for expelling acculumated dust from the cell downwardly into an annular space between the hoppers. (Author abstract modified)

49608 **APTIC NO. 71652**

Arvai, J.

CLEAN AIR MAINTENANCE IN HUNGARY. *(Levegotisztasag-vedelem Magyarorszagon). Text in Hungarian. Energiagazdalkodas, 15(9):395-402, Sept. 1974.*

Recent achievements and current problems in clean air maintenance in Hungary are discussed. The existence of both local and regional air pollution was confirmed, with the major pollutants being sulfur dioxide and, in residential and commercial areas, traffic-generated nitrogen oxides and carbon monoxide. The air pollution situation in Budapest is being improved by the relocation of polluting industrial plants to the country, and by a general changeover to natural gas. Recent legislation envisages the establishment of three different protection zones within the country. Emission controls, technological improvements, the replacement of certain raw materials and and energy carriers by non-polluting ones, dilution of harmful emissions by high stacks, and segregation of industrial from residential and recreational areas are the basic guidelines of the clean air maintenance policy. Air pollution control requirements must be considered in new projects. Clean air maintenance efforts in existing facilities are partly financed from clean air maintenance funds.

49609 **APTIC NO. 71594**

Asada, Tsunesaburo, Toshiahi Komatsu, Koji Ishizaki, and Katsuhiko Katsuto

DUAL METHOD FOR ACIDIC GASES REMOVAL AND DESALINATION OF SEA WATER. *(Sansei haigasu no jokkyo to dojini kaisui datsuen o okonau hoho). Text in Japanese. (Kobe Seiko Co., Ltd., Kobe (Japan)) Japan. Pat. Sho 49-49304. 6p., Dec. 26, 1974. (Appl. June 27, 1970, 1 claim).*

Improvements of the processes of desalting of sea water by the inverse permeation method and removal of acidic gases by the wet method are presented. Sea water was pumped to a precipitation tank, where precipitates were removed, and then to an electrolytic bath through a filter. Sodium chloride and magnesium chloride were converted to sodium hydroxide and magnesium hydroxide, and chlorine gas and hydrogen gas were collected in separated tanks The alkaline solution was fed to an absorbing tower to which waste gases containing sulfur dioxide, sulfur trioxide, oxygen, and hydrogen sulfide were also introduced. Purified gases were released from the top of the tower whereas resulting sulfates, sulfites, carbonate, and bicarbonate were pumped to a desalting device (inverse permeation method). Desalted water was stored in a tank and the concentrated solutions of the salts were introduced to two evaporation tanks. Distilled water was led to the same storage tank, and salts were obtained as by-products.

49610 **APTIC NO. 72038**

Aso

A UNIT CAPABLE OF ELIMINATION OF FLUORINE AND SULFUR FROM EXHAUST GAS. *(Haien datsu fusso datsuryu sochi). Text in Japanese. Mitsubishi Jushi Giho (Mitsubishi Plast. Tech. Rev.), no. 8:78-80, Aug. 1974.*

Japan Selcoat Co., Ltd. is planning to put a unit capable of eliminating fluorine and sulfur from exhaust gas on the market. This unit, which is a combination of a cellkit scrubber as gas absorption unit and a pre-coat-type exhaust gas treatment unit using the dehydration and drying method developed by Hiratsuka Environment Research Institute, is characterized by an excellent capacity to remove F and S, low operation costs, simple maintenance and operation, and compactness. The unit consists of a cooling process, absorption process, exhaust gas treatment process, and filtration-dehydration process. Exhaust gas is normally at such a high temperature that it must be cooled by spraying water prior to the absorption process. If powder dust is present in much quantity, it can be removed with a cooling tower. If a cellkit fan is placed between the cooling tower and the absorption tower, it helps to prevent the smoke duct from being corroded.

49611 **APTIC NO. 72273**

Atkin, Robert F.

INCINERATION. *(Pyrocom, Inc., Campbell, Calif.) U. S. Pat. 3,828,701. 5p., Aug. 13, 1974. 6 refs. (Appl. May 29, 1973, 5 claims).*

An incinerator that, unlike prior-art devices, is capable of burning solid wastes containing a substantial amount of plastic materials (up to 100%) without creating attendant atmospheric pollution (particulates, hydrocarbons, carbonyl compounds) is described. The incineration is accomplished by a controlled, stabilized combustion process wherein solid wastes are volatilized at a controlled rate in the presence of a flame. The resultant combustion gases are combined with excess oxygen and are burned in an oxidizing flame. The remaining combustion products are then thoroughly mixed with the remaining excess oxygen at an elevated temperature of 1600-1800 F and accelerated into another oxidizing flame where the residue of plastic materials is completely consumed.

49612 ***APTIC NO. 71753***

Baba, Yasuo

ULTRASONIC CLEANING APPARATUS FOR SMOKE. (Baien no choonpa joka sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 49-46339. 3p., Dec. 9, 1974, 1 ref. (Appl. Feb. 9, 1970, 1 claim).

Ultrasonic waves generated by an oscillator are used to condense smoke particles in water, thus purifying the smoke before its expulsion into the air. The ultrasonic wave oscillator is placed underneath a vessel filled with flowing water. A shelf juts out into the water, perpendicular to the flow of water. Smoke is introduced into the vessel beneath the shelf, perpendicular to the flow of the water. Ultrasonic waves of the proper frequency cause condensation of smoke particles before the purified smoke is expelled through a chimney into the air. Smoke condensate is carried out of the vessel by the flowing water.

49613 **APTIC NO. 69649**

Baldwin, R. M., J. O. Golden, J. H. Gary, R. J. Long, and R. L. Bain

MATHEMATICAL MODELING OF THE SELECTIVITY OF THE SOLVENT-REFINING PROCESS IN THE REMOVAL OF SULFUR FROM COAL. *Preprint, American Inst. of Chemical Engineers, New York, 45p., 1974. 18 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 78th, Aug. 18-21, 1974.)*

Research to determine the importance of operating variables and raw material properties upon coal desulfurization via the solvent refining process is discussed. The process was studied in a statistically designed experimental program using bench scale, high-pressure, high-temperature rocking-bomb autoclave batch reactors. A coal-solvent slurry was reacted at elevated temperatures and pressures in the presence of hydrogen, resulting in a liquefied coal product. The product was vacuum distilled to recover solvent as the distillate and a solid solvent refined coal product residue. The coal product was analyzed for sulfate, pyritic, and total sulfur content, with the organic sulfur content determined by the difference. Initially five control variables were studied: temperature, partial pressure of hydrogen, solvent-to-coal ratio, solvent type, and reaction time. Statistical analysis of the data showed temperature, pressure, and solvent-to-coal ratio to be statistically significant, and anthracene oil to be the better desulfurization solvent. Experimental work to further investigate the variables on desulfurization via the solvent refining process was completed, and mathematical models for the removal of the different sulfur solvent refined coal was analyzed for hyrodgen and sulfur content. Benzene extraction tests on the dissolved coal indicated unsolubles of 12-58% for the bituminous coal and from 34-77% for the subbituminous coal. Gas analysis by chromatography showed small amounts of C1 through C4 in the reaction product gas in addition to hydrogen, carbon dioxide, and H2S. Desulfurization of coal char via the solvent refining process was also studied. Statistical testing showed temperature, pressure, and solvent-to-coal ratio to be statistically significant at the 99% confidence level for coal char desulfurization. (Author abstract modified)

49614 **APTIC NO. 72173**

Bando, Shunichi

PREVENTION AND TREATMENT OF SMOKE FORMATION IN HEAT-COATING PROCESS. *(Kanetsu kotingu ni okeru hatsuen boshi shoriho). Text in Japanese. (Nihon Kogei Kogyo Co., Ltd. (Nihon Polytechnic Industries), Tokyo (Japan)) Japan. Pat. Sho 49-46830. 4p., Dec. 12,1974. (Appl. Oct. 29, 1970, 1 claim).*

Prevention and treatment of smoke formation for heating-coating processes, in which rollers are used to apply coating material, are described. One terminal (usually negative) of a direct current, high-voltage generator installation is connected to suspended pointed electrodes. The pointed electrodes can be metal rods, wires, strips, or rope-type electrodes with cores of nylon, propylene, or other synthetic resins covered by conductive rubber sheathing containing carbon black; but they all have an angular edge running the length of the electrode. The other terminal (usually positive) is grounded through connections with coating rollers and hating vessels. When voltage is applied, a high-voltage field is created between the pointed electrodes and the equipment at ground potential. The distance between pointed electrodes and the equipment is adjusted as necessary to form a suitable high voltage field (about 80 kV). Vaporized coating material (e.g., coal tar) immediately settles on coating rollers, heating vessels, and coating surface, and thus smoke formation by coating material is prevented.

49615 **APTIC NO. 72192**

Beck, Joseph J.

RECUPERATORS FOR INCINERATORS. *(McQuay-Perfex, Inc., Minneapolis, Minn.) U. S. Pat. 3,829,285. 6p., Aug. 13, 1974. 12 refs. (Appl. Feb. 28, 1973, 1 claim).*

A heat recuperator for incinerators, furnaces, and the like is described that unlike prior art recuperators is inexpensive and can be installed onto an existing unit with a minimum of modifications. The recuperator assembly consists of an elongated cylindrical outer shell with one or more tubular members positioned within and parallel to the outer shell. The space between the inner tubular member and the outer shell defines a heating passage. Several heat exchange fins project from both the inside and outside of the tubular member. The heat exhange tubes are held in a fixed position at one end of the shell and by an expansion seal at the other end. Exhaust gases are conducted through the heat exchange tubes, and process air is directed around the heat exchange tubes for preheating. The heat recovered by the recuperator serves to preheat the air fed into the furnace, thus resulting in increased combustion efficiency less pollutant emission, and reduced fuel requirements.

49616 **APTIC NO. 71973**

Behie, S. W. and J. M. Beeckmans

EFFECTS OF WATER INJECTION ARRANGEMENT ON THE PERFORMANCE OF A VENTURI SCRUBBER. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 128-143. 25 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

The effect of three different arrangements of two water manifold injection systems on the performance of a venturi scrubber was studied. Velocities ranging from 23.4-49.7 m/sec were used with aerosol diameters of 0.8, 1.6, 2.9, and 5.0 micron. Particle size had little effect on theoretical scrubber efficiency for particles 3 micron or more in diameter. Scrubber efficiency was less than theoretically predicted for smaller particles. The use of water manifold with 0.5 mm orifices resulted in greater scrubbing efficiency than that obtained with a manifold having 2.0 mm orifices. The reason for the increased efficiency was due to better throat coverage with the more closely spaced orifices, though other factors may also be involved. The injection of water from one side only of the scrubber generally resulted in the highest collection efficiencies. There were little consistent differences in pressure drop for the different injection system arrangements.

49617 **APTIC NO. 68139**

Bilbrey, J. H., Jr., K. C. Dean, and J. W. Sterner

DESIGN AND OPERATION OF AN AUTOMOBILE AND RAILROAD CAR INCINERATOR. *Preprint, American Inst. of Mining, Metallurgical, and Petroleum Engineers, New York, Metallurgical Society, 7p., 1974 (?). (Presented at the American Institute of Mining, Metallurgical, and*

Petroleum, Engineers, Metallurgical Society, 1974, Paper A74-88.)

A low-cost, smokeless automobile incinerator capable of burning up to 80 flattened automobiles in an 8-hour operating day was designed and operated over the past 4-years. Based upon the successful operation of this prototype, a modified incinerator capable of burning both railroad cars and automobiles was designed and constructed by a major scrap processor. Research on the operation of the incinerator was conducted during the past year, burning flattened and unflattened automobiles an stock, box, and work railroad cars. Although many maintenance problems were encountered from the materials of construction, operation of the incinerator was successful. Smokeless incineration of railroad cars and automobiles was possible in 23 of 25 tests made in the late stages of operation. Smoke emission in the other two burns was of less than 2-minute duration in each case. The average time for burning a batch of 20 unflattened automobiles was about 35 minutes, and the railroad cars ranged from between 60 and 75 minutes each for complete burnout. (Author abstract)

49618 **APTIC NO. 71869**

Birk, James R. and Christian M. Larsen

REGENERATION OF ABSORBENT FOR SULFUR OXIDES. *(North American Rockwell Corp., El Seguando, Calif.) Brit. Pat. 1,360,097. 8p., July 17, 1974. (Appl. Sept. 28, 1971, 7 claims).*

An improved method for the removal of sulfur oxides from flue gases via contact of the latter with a molten alkali metal carbonate is described which, unlike a previous similar process, utilizes oxygen in an absorbent conversion step to generate the necessary heat for a reduction reaction. The process consists of an absorption, reduction, and reformation stage. In the absorption stage, flue gas is contacted at a temperature of at least 350 C with a molten salt mixture containing alkali metal carbonate as the active absorbent to convert a portion of the sulfur oxides to the alkali metal sulfite and/or sulfate form. The converted absorbent is then reduced to the alkali metal sulfide form by contact with a carbonaceous reducing agent. The reduction stage is carried out at a temperature of at least 600 C, with the reduction temperature being maintained by adding a supply of free oxygen. In the reformation stage, the reduced absorbent is reconverted into the alkali metal carbonate form by contact with carbon dioxide and steam, with the resulting release and recovery of hydrogen sulfide.

49619 **APTIC NO. 71632**

Blanken, Guenther

ODOR REDUCTION AT THE APPLICATION OF LIQUID MANURE. *(Geruchsminderung bei Ausbringung von Fluessigmist). Text in German. Landtechnik, 29(11):504-505, Nov. 1974.*

For reduction of the odor emission during application of liquid manure to fields four methods are briefly described, an aerator for reducing odors by aerobic treatment, treatment of liquid pig manure with alzogur, use of pumps with agitators to shorten the time of agitating and filling of the tank truck, and finally tank trucks with devices for direct application of liquid manure. An aerator resting on floats is capable of supplying a liquid manure basin with a diameter of 20 m holding 3000 or 4000 cu m with sufficient oxygen to neutralize the odorous substances. It prevents the anaerobic decomposition of liquid manure. Alzogur, which consists of about 50% cyanamide, mixed with liquid pig manure prevented bacterial activity so that no sewer gas could develop. For good efficiency at least one liter of alzogur per cubic meter of manure is needed. One liter of alzogur costs $1.10. Two submersion pumps and four tank trucks equipped with different devices for applying manure to the fields are described. Three tank trucks have devices which cover the manure immediately with soil, while the fourth unit applies it to the surface. To keep odors low the manure is allowed to flow out and is not sprayed out.

49620 **APTIC NO. 72213**

Bogatyrev, M. F. and A. V. Tonkonogiy

CLEANING OF CONCENTRATED SULFUROUS GASES WITH HIGH DUST CONTENTS. *(Issledovaniye ochistki vysokozaplylennykh kontsentrirovannykh sernistykh gazov). Text in Russian. Tsvetn. Metal., no. 11: 47-52, Nov. 1974. 5 refs.*

The conditions of dry electrostatic precipitation of high dust concentrations from hot flue gases with high sulfur dioxide concentrations, as generated during the melting of sulfide batches containing 22-34% sulfur, as well as iron, copper, zinc, lead, nickel, cobalt, tin, silica, and calcia were studied. The dust present in the flue gas contained SO2, sulfur trioxide, and sulfates and oxides of the above metals. With respect to the effect of temperature as well as the SO2 and SO3 on the resistivity of dust particles of different composition, the lower temperature limit for the electrostatic precipitator was established at 333 C. It was possible to reduce the dust concentration in the flue gas from 315 g/cu m to 0.05 g/cu m at a flow rate of 0.3 m/sec.

49621 **APTIC NO. 71971**

Boll, R. H., L. R. Flais, P. W. Maurer, and W. L. Thompson

MEAN DROP SIZE IN A FULL SCALE VENTURI SCRUBBER VIA TRANSMISSOMETER. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 91-108. 16 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

The construction and application of a light transmissometer capable of making mean drop size measurement with a full scale venturi scrubber to within + or - 15% are described. Studies of liquid distribution within an experimental venturi using the transmissometer indicated that such distribution is less uniform than visual observation suggests. Application of the transmissometer to the measurement of mean drop sizes revealed that the Nukiyama-Tanasawa equation gives values of mean drop size that are accurate within about 50% for liquid to gas ratios and throat velocities of commercial interest. The equation consistently overestimated mean drop size at high gas velocities and underestimated it at low gas velocities. An empirical equation involving gas velocity to the -1.602 power was much more successful.

49622 **APTIC NO. 75292**

Bulgakova, N. G. and S. S. Yankovskiy

MODELING LABORATORY CYCLONES. *(K voprosu modelirovaniya laboratornykh tsiklonov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology. U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 9-13, Sept. 1974. 5 refs. Translated from Russian, 5p. (Entire report of TR 104-75 processed under APTIC 70040.)*

A method for calculating the overall collection efficiency and dimensions of laboratory cyclones for a given dust particle size and various gas flow rates is described. The calculations are based on two parameters: the particle diameter at which the efficiency is 50% and the standard deviation of the particle distribution. Mathematical expressions for the particle diameter are derived for geometrically similar cyclones and geometrically dissimilar cyclones. In the latter case, the apparent gas velocity in the cyclone is substituted with the velocity at the inlet section of the cyclone since the motion of the gas in the cyclone occurs such that the diameter of the jet moving in a spiral corresponds to the diameter of the inlet section. Studies of the effect of the flow velocity on the parameters of the fractional characteristics are carried out for gas flow rates of 5-30 l/min. 75292 Bulgakova, N. G. and S. S. Yankovskiy

49623 **APTIC NO. 69284**

Burchard H.-J. and K.-D. Repenning

ECONOMIC PROBLEMS IN CONNECTION WITH THE DESULFURIZATION OF FUEL OILS. *(Oekonomische Probleme in Verbindung mit der Entschwefelung von Heizoelen). Text in German. Brennstoff-Waerme-Kraft, 26(9): 398-403, Sept. 1974. 4 refs.*

The anticipated increase of sulfur dioxide emission in the Federal Republic of Germany based on the growth of the power demand will rise by 13% until 1980 and by 16% until 1985 if no additional measures are taken to reduce the emissions. The best and most widely accepted solution to stop this trend is the reduction of the sulfur content in light fuel oil from 0.6 to 0.3% at a cost of $2.33/ton. Since light fuel oil is used for domestic heating and traffic, a reduction of the sulfur emissions by these sources would have great impact on the ground level emission concentration. For heavy fuel oil only a combination of various measures will achieve the goal of markedly reducing the SO2 emissions. Possible solutions could be the construction of power plants with flue gas desulfurization where residues from mineral oil processing with a high concentration of sulfur can be burned. Furthermore, refineries should strive to succeed in direct desulfurization of residues. The promising method of achieving desulfurization directly prior to the combustion process through gasification is applicable to coal as well as residual oil. However, no experience has been gained yet which would permit a comparison with other desulfurization methods.

49624 **APTIC NO. 71967**

Calvert, Seymour

ENGINEERING DESIGN OF FINE PARTICLE SCRUBBERS. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 12-32. 5 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

The state of the art of particle scrubbing is discussed, with particular reference to performance prediction methods. When particle collection is due to inertial impaction only, high efficiency on submicron particles requires the expenditure of high pressure drop. Other particle separation phenomena such as Brownian diffusion, diffusiophoresis, thermophoresis, and electrophoresis can give high efficiency at low pressure drop. Particle growth by any of several mechanisms can provide the means for subsequent high efficiency collection by intertial impaction. A relationship between the particle diameter collected at 50% efficiency and scrubber pressure drop for several of the most common scrubber types is presented for estimating scrubber performance.

49625 **APTIC NO. 71975**

Calvert, Seymour and Nikhil C. Jhaveri

FLUX FORCE/CONDENSATION SCRUBBING. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 161-193. 17 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

Design considerations for flux force/condensation scrubbers are reviewed, and experimental results are presented from bench and pilot tests of two multiple sieve plate scrubbers used to remove submicron particles. Particulate loads over nine pilot runs varied from 350-10,500 g/dry standard cu m at the output and from 15,700-58,900 g/dry standard cu m at the input. Pressure drop varied from 31.9-34.8 cm. The performance of the scrubbers depended heavily on the amount of vapor available for condensation and the number concentration of particles. Scrubber efficiency was relatively unaffected by particle size. Economic considerations defined the most favorable area of application for flux force/condensation scrubbing as those situations in which the enthalpy of vaporization is available from the gas to be cleaned. The purchase of steam can be justified when high collection efficiency for fine particles is needed or an existing scrubbing is upgraded for the removal of submicron fume.

49626 **APTIC NO. 71977**

Calvert, Seymour, Indrakumar L. Jashnani, and Shuichow Yung

ENTRAINMENT SEPARATORS FOR SCRUBBERS. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 207-228. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

Experimental and theoretical findings concerning entrainment separation of liquid drops generated by scrubbers are presented for packed bed, knitted mesh, zigzag baffle, tube bank, and cyclone type separators. Theoretical models for calculating primary efficiency and pressure drop for baffle devices showed good agreement with experimental data. The pressure drop in cyclone separators varied as the square of the geometric average velocity in the cyclone inlet and outlet. The effect of liquid load on pressure drop was negligible in packed bed, baffle, tube bank, and cyclone type collectors. Collection efficiencies were nearly 100%, with the mass median drop size for reentrainment varying between 25-650 micron. The minimum drop size present in the reentrainment was 40 micron.

49627 **APTIC NO. 75099**

Calvert, Seymour, Nikhil C. Jhaveri, and Shuichow Yung

FINE PARTICLE SCRUBBER PERFORMANCE TESTS (FINAL REPORT). *A.P.T., Inc., Riverside, Calif., Environmental Protection Agency Contract 68-02-0285, Program Element 1AB012, ROAP 21ADJ-037, Rept. EPA-650/2-74-093, 271p., Oct. 1974. 6 refs.*

NTIS: PB 240325/AS

Various types of stack gas scrubbers were field tested at industrial installations to assess their particle collection performance. The approximate cut diameters (at 50% efficiency) measured were: 1.2 micron for a valve tray type scrubber on a urea prilling tower; 1.2 micron for a vaned centrifugal scrubber on a potassium chloride dryer; 0.4 micron for a mobile bed scrubber on a coal-fired utility boiler; 0.7 micron for a venturi scrubber on a coal-fired utility boiler, 0.8 micron for a wetted fiber scrubber on a sodium chloride dryer; 1.0 micron for an impingement plate scrubber on a sodium chloride dryer; and 0.3 micron for a venturi rod scrubber on a foundry cupola. The test of a hybrid scrubber at a metal melting facility was abandoned due to operating problems. Mathematical models were satisfactory for all of the scrubbers tested except the mobile bed. Data on investment and operating costs and maintenance were generally not available in complete form.

49628 **APTIC NO. 71581**

Campbell, John Stewart and Phineas Davies

CATALYTIC PROCESS FOR TREATING EXHAUST GASES. *(Imperial Chemical Industries Ltd., London (England)) Brit. Pat. 1,360,976. 16p., July 24, 1974. (Appl. Oct. 14, 1970, 20 claims).*

A reduction catalyst for the conversion of nitrogen oxide emissions from internal combustion engine exhausts to nitrogen, rather than ammonia as in prior-art designs, is described. The exhaust gas is passed over a high temperature steam reforming catalyst consisting of nickel, cobalt, or a platinum group metal and a refractory oxidic catalyst support material under net reducing conditions at a temperature of over 500 C. The conditions of temperature, catalytic activity, and space velocity are chosen to achieve a nitrogen oxide conversion of at least 70%, with no more than 20% of the nitrogen oxides being converted to ammonia.

49629 **APTIC NO. 71947**

Clay, David T. and Scott Lynn

REDUCTION AND REMOVAL OF SO2 AND NOX FROM SIMULATED FLUE GAS USING IRON OXIDE AS CATALYST/ABSORBENT. *Preprint, American Inst. of Chemical Engineers, New York, 38p., 1974. 25 refs. (Presented at the American Institute of Chemical Engineers Annual Meeting, 67th, Washington, D. C., Dec. 3, 1974.)*

The reduction and removal of sulfur dioxide and nitrogen oxides from simulated flue gas were investigated using iron oxide a catalyst/absorbent. Iron oxide is converted to the ferrous state, nitric oxide is reduced to nitrogen or ammonia, and SO2 is removed as ferrous sulfide or sulfate. Regeneration with air produces SO2 and reforms Fe2O3. The reduction of SO2 by carbon monoxide and hydrogen was studied in fixed bed reactors to determine the effects of temperature and of the other reactive components of flue gas (excepting fly ash) on the rate of reaction and the products formed. Hydrogen sulfide and carbonyl sulfide react with ferrous oxide to form ferrous sulfide. Under readily attainable conditions virtually complete removal of sulfur compounds was achieved for gas-phase residence times of the order of 1-10 ms. Nitric oxide and oxygen were also reduced. The conditions under which O2 poisons the catalyst were determined. (Author abstract modified)

49630 **APTIC NO. 72193**

Collins, John Joseph

PURIFICATION OF HYDROCARBON FEEDSTOCKS. *(Union Carbide Corp., New York) U. S. Pat. 3,816,975. 5p., June 18, 1974. 4 refs. (Appl. June 18, 1974, 1 claim).*

A method for the adsorptive removal of sulfur and water impurities from olefin-containing hydrocarbon feedstocks is described that eliminates or greatly diminishes the formation of olefin-derived coke deposits on the adsorbent, a problem associated with prior-art processes of similar nature. The olefin-containing feedstock is dehydrated and desulfurized by a selective adsorption in the liquid phase using large pore zeolitic molecular sieves. Coking of the adsorbent is prevented by avoiding contact of the olefin with the sorbate-free adsorbent and by desorbing olefin from the adsorbent by displacement with water. The zeolitic molecular sieve adsorbent has an apparent pore diameter of greater than 6 A and is operated at a bed temperature of below 300 F.

49631 **APTIC NO. 71704**

Cook, Henry A. and Jerrold E. Radway

TREATMENT OF FLUE GASES AND THE LIKE. *(Basic Inc., Cleveland, Ohio) U. S. Pat. 3,826,812. 6p., July 30, 1974. 7 refs. (Appl. Oct. 22, 1971, 10 claims).*

A process for the simultaneous scrubbing of fly ash and sulfur oxides from flue gas is described that overcomes prior-art disadvantages relating to removal of the fly ash from the alkaline scrubbing material and recovery of pure sulfur dioxide. The flue gases are treated with an aqueous mixture of a Group II metal oxide, hydroxide, or carbonate which forms a suspension of an insoluble or partially soluble metal sulfite and fly ash. The insoluble sulfite is converted to the soluble bisulfite to facilitate separation of the solid fly ash and insoluble impurities. The sulfur dioxide and metal oxide are subsequently recovered from the bisulfite solution. A particularly useful Group II metal compound for the process is magnesium oxide. (Author abstract modified)

49632 **APTIC NO. 72182**

Copa, William M. and Louis A. Pradt

WASTE GAS PURIFICATION. *(Sterling Drug Inc., New York) U. S. Pat 3,828,525. 3p., Aug. 13, 1974. 1 ref. (Appl. April 16, 1973, 3 claims).*

An activated sludge scrubbing method for the removal of odors and contaminants like hydrocarbons, ammonia, alcohols, aldehydes, ketones, nitriles, and carbon monoxide from waste gases emanating from wet air oxidation reactors at sewage treatment plants is described. The invention overcomes problems of limited solubility associated with conventional gas scrubbing methods. The waste gas is passed through an aqueous suspension of activated sludge or a mixed liquor obtained by the addition of activated sludge to fresh sewage. The solids content of the activated sludge is preferably between 5000 and 10,000 mg/l, and the suspended solids concentration of the mixed liquor is preferably between 2000 and 4000 mg/l. The scrubbing medium, whether activated sludge or mixed liquor, is self regenerated because the oxygenated organic compounds in the exhaust gas are readily oxidized by the biological processes that occur in the medium. Thus, the same volume of activated sludge or mixed liquor can be repeatedly used as the scrubbing medium for a long period of time.

49633 **APTIC NO. 71848**

Crowley, William Anthony

APPARATUS FOR, AND A METHOD OF, REMOVING PARTICULATE AND GASEOUS POLLUTANTS FROM STACK SMOKE. *(Assignee not given.) Brit. Pat. 1,364,003. 5p., Aug. 21, 1974. (Appl. July 26, 1972, 20 claims).*

A wet scrubbing system for the removal of particulate and gaseous pollutants from stack smoke is described. A hollow elongated cylindrical conduit section is vertically and centrally disposed within the exhaust stack. An outwardly flared frustoconical conduit section is integrally formed with the bottom end of the cylindrical conduit and extends outwardly to the inside of the stack. A conical deflector is housed above the top end of the cylindrical conduit section. The deflector extends downwardly and outwardly across the top end of the cylindrical conduit, with its edge terminating inward of the stack interior so that the edge and the stack form an annular passage for exhaust stack smoke. A water discharge nozzle, preferably of the semi- cylindrical configuration, is mounted above the conical deflector and transversely disposed in the stack. A water collection section (annular dish configuration) is fitted between the inside of the stack and the outside of the cylindrical conduit section. A discharge orifice for receiving a discharge pipe is located at the lowest point of the collection section.

49634 **APTIC NO. 71702**

Csicsery, Sigmund M. and Bernard F. Mulaskey

TWO-STAGE FUEL INJECTION COLD START METHOD AND APPARATUS FOR CARRYING OUT SAME. *(Chevron Research Co., San Francisco, Calif.) U. S. Pat. 3,826,237. 14p., July 30, 1974. 6 refs. (Appl. Oct 4, 1972, 8 claims).*

A system for improving cold-start performance and controlling evaporative emissions from an internal combustion engine is described that permits faster warm-up without the use of more volatile fuel. The lower molecular weight constituents of a full-range gasoline are selectively eluted for simultaneous use at a cold start valve attached at the intake manifold as well as at a series of injector valves positioned adjacent to the combustion chambers of a fuel-injected internal combustion engine. The elution system includes a bed of adsorbent material (e.g., activated alumina) forming an elution zone within a cannister assembly in fluid contact with the full-range gasoline. The adsorbent material, usually in pelletized form, is preferably housed in a tubular means disposed in the cannister assembly. The tubular means is positioned within a much larger shell housing in fluid contact with a valve and conduit network. Entry of the gasoline into the elution zone as well as the entry of the lower molecular weight effluent into the engine is controlled by a valve and conduit network under the control of a fuel injection control circuit. A vapor emission control system can also be housed within the cannister assembly to prevent escape of vapors from the gasoline tank.

49635 **APTIC NO. 75105**

Ctvrtnicek, T., T. W. Hughes, C. M. Moscowitz, and D. L. Zanders

REFINERY CATALYTIC CRACKER REGENERATOR SOX CONTROL - STEAM STRIPPER LABORATORY TEST (FINAL REPORT). *Monsanto Research Corp., Ohio, Dayton Lab., Environmental Protection Agency Contract 68-02-1320, Program Element 1AB013, ROAP 21ADC-031, Task 1, Phase II, Rept. EPA-650/2-74-082-a. MRC-DA-446, 248p., Nov. 1974.*

NTIS: PB 239343

Steam contacting of spent catalyst used in petroleum refinery fluid catalytic crackers was experimentally tested in a semibatch fluidized bed reactor system as a method for reducing sulfur oxide emissions from catalytic crackers. Spent catalyst samples were exposed to steams at temperatures between 755 and 811 K and pressures of 1-35 psig at steam stripping rates of 1-200 kg water/100 kg/catalyst. Catalyst steam exposure times ranged from 0-3600 sec. Both air-saturated and oxygen-free distilled waters were used for superheated steam preparation, and the presence of oxygen had no significant effect on sulfur removal efficiency for the spent catalyst. The reduction of sulfur on spent catalysts to levels of 200 ppm SO2 in regenerator off gas was demonstrated with four catalyst samples. Other samples achieved reductions of at least 40-50%. Catalyst steam contacting also removed volatilized hydrocarbons from the spent catalyst in addition to sulfur. In terms of capital investment costs steam stripping is competitive with fluid catalytic cracker feed desulfurization for steam stripping rates below 70 kg/steam 100 kg catalyst. The process is competitive in terms of operating costs in the range of 54-81 kg steam/100 kg catalyst.

49636 **APTIC NO. 72070**

Dawson, Gary D. and Robert S. Harris

AN EXHAUST GAS RECIRCULATION CONTROL FOR INTERNAL COMBUSTION ENGINES. *(Chrysler Corp., Highland Park, Mich.) U. S. Pat. 3,818,880. 5p., June 25, 1974. 1 ref. (Appl. Aug. 2, 1972, 8 claims).*

An exhaust gas recirculation system for the control of nitrogen oxide emissions from automobile exhausts is described that allows for full engine power at wide open throttle in contrast to prior-art recirculation systems. The exhaust gas recirculation valve, which is normally in an open position, automatically closes whenver a venturi control signal achieves a predetermined relationship to the value of the engine manifold vacuum (under conditions of near or wide open throttle when maximum power is required). The system includes: a vacuum operated exhaust gas recirculation valve; a vacuum reservoir for providing an operating control vacuum to the recirculating valve; an engine manifold vacuum source for providing vacuum to the vacuum reservoir during engine operation; a control means which is responsive to the vacuum control signal and which modulates the operating control vacuum in accordance with the vacuum control signal; a carburetor venturi vacuum source which provides a carburetor venturi vacuum control signal to the control means; and a vacuum relief which vents the vacuum reservoir to the engine manifold vacuum level.

49637 **APTIC NO. 71580**

Dawson, Harry

IMPROVEMENTS IN OR RELATING TO INCINERATORS. *(Ames Crosta Ltd., Heywood (England) and Frank Sanderson, Rochdale (England)) Brit. Pat. 1,360,967. 4p., July 24, 1974. (Appl. June 19, 1970, 7 claims).*

A clean burning incinerator that is particularly suitable for the treatment of waterlogged solids (e.g., sewage) is described. The incinerator consists of an open-ended rotatable drum for agitating waste material, a burner for directing a flame against the agitated material, and a means for drawing air through the heated part of the drum. Ash which accumulates in the casing is withdrawn through a pipe by a cyclone where the solids are removed and clean air exhausted to the atmosphere.

49638 **APTIC NO. 72275**

De Martelaere, David L.

METERING EXHAUST GAS RECIRCULATION APPARATUS AND SYSTEM. *(Colt Industries Operating Corp., New York) U. S. Pat. 3,828,746. 8p., Aug. 13, 1974. 6 refs. (Appl. Dec. 1, 1972, 16 claims).*

An exhaust gas recirculation device for the control of nitrogen oxide emissions from automotive internal combustion engines is described that provides for the metered control of exhaust recirculation to the intake manifold in response to engine operation conditions. A valve assembly that is exposed to the comparatively low pressure of the intake manifold interior and is also connected to the exhaust system controls the volume rate of exhaust gas recirculated. A spring-loaded pressure responsive diaphragm in the valve assembly is connected to a stem carrying a valve that is movable to any of several general operating positions for the opening and closing of an associated port leading to the intake manifold. The valve means is closed during periods of engine idle and deceleration and is open to permit a maximum volume rate of exhaust recirculation during periods of acceleration.

49639 **APTIC NO. 71686**

De Corso, Serafino M., Charles E. Hussey, Jr., and Michael J. Ambrose

SYSTEM FOR REDUCING NITROGEN-OXYGEN COMPOUND IN THE EXHAUST OF A GAS TURBINE. *(Westinghouse Electric Corp., Pittsburgh, Pa.) U. S. Pat. 3,826,080. 5p., July 30, 1974. 9 refs. (Appl. March 15, 1973, 8 claims).*

A system for reducing nitrogen oxide emissions from gas turbine engines is described. A fuel injection nozzle disposed adjacent one end of the combustion chamber is used to atomize the fuel mechanically at high fuel flows, while atomizing air is used at lower fuel flows. A system for supplying a pressurized coolant (e.g., water) to the atomizing passageway and orifices of the injector is provided to reduce the flame temperature and thus the quantity of nitrogen oxides emitted in the exhaust.

49640 **APTIC NO. 69446**

Dunn, H. S. and P. H. Wojciechowski

ENERGY STORAGE AND CONVERSION EFFICIENCY IN A HYDRAULIC/GAS- TURBINE HYBRID. *Preprint, American Society of Mechanical Engineers, New York, 16p., 1974. 6 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, Zurich, Switzerland, March 30-April 4, 1974, Paper 74-GT-107.)*

An energy storage system having a limited capacity is described which can remove the burden of acceleration from the vehicle prime mover in typical urban driving situations and provide an efficient regenerative braking system to significantly increase fuel economy over stop-start driving schedules. Energy is stored in a hydraulic accumulator which is an integral part of a hydraulic transmission. Data from laboratory tests are presented to indicate achievable energy conversion efficiencies. Computer simulation of various size vehicles being driven over typical urban-suburban driving schedules is used to estimate the reduction in vehicular emissions and energy consumption resulting from the energy storage capability. The average increase in fuel consumption with the OC-70 system was 25%, while the average increase for the SSS-12 was 20%. The emissions/vehicle mile decreased substantially with the use of the hydraulic system with two minor exceptions. For the OC-70, carbon monoxide increased slightly by about 1-2%, while the emissions of unburned hydrocarbons and nitrogen oxides decreased on the average of 14 and 30%, respectively. For the SSS-12, a 50% reduction in CO was observed, HC increased by about 3%, and NOx decreased by 25%. (Author abstract modified)

49641 **APTIC NO. 71880**

Easterling, Mahlon

THE ROLE OF PERIODIC MOTOR VEHICLE INSPECTION IN AIR POLLUTION ABATEMENT. *Transp. Res. Rec., no. 492:36-40, 1974. 4 refs. (Presented at the National Research Council, Highway Research Board, Annual Meeting, 53rd, Washington, D. C.)*

Proposals are outlined for a mandatory periodic motor vehicle inspection and maintenance program designed to reduce emissions from existing and new vehicles. The following recommendations are made: the inspection should be performed by the state or a state-supervised nonprofit organization; maintenance should be performed by whomever the vehicle owner chooses; inspection should be tied to registration; the vehicle should be tested under a sufficient number of operation modes; the inspection should provide diagnostic information to aid in the repair of the vehicle; the test procedure should be simple, inexpensive, and rapid; the inspection system should start with pilot programs in selected areas with severe air pollution; and emission inspections should be combined with safety inspections to minimize inconvenience to vehicle owners. (Author summary modified)

49642 **APTIC NO. 68081**

Eatock, H. C., J. C. Plucinsky, and J. A. Saintsbury

DESIGNING SMALL GAS TURBINE ENGINES FOR LOW NOISE AND CLEAN EXHAUST. *J. Aircraft, 11(10):616-623, Oct. 1974. 8 refs. (Presented at the Canadian Aeronautics and Space Inst./American Inst. of Aeronautics and Astronautics Aeronautical Meeting, Montreal, Canada, Oct. 29-30, 1973, Paper 73-1154.)*

Preliminary results of design studies involving the use of small gas turbine engines to reduce noise and exhaust emissions from aircraft are reviewed. Comparisons of reciprocating engines with small turboprop engines indicate lower carbon monoxide and hydrocarbon emissions for the latter engine type at all power settings. The piston engines show somewhat lower nitrogen oxide production above 20% power, consistent with the fuel-rich operation of such engines. Small gas turbine engines have higher CO and unburned hydrocarbon emissions at low power and lower NOx levels at higher power than large gas turbines. The comparatively poor performance of the small engines at low power is due primarily to operation at low combustor pressure and temperature as well as to a high ratio of combustor surface area to volume and to the use of relatively simple and low-cost combustor and fuel systems. The good NOx performance at high power is due principally to lower levels of combustor inlet pressure and temperature. Early development data indicate that major reductions in CO and unburned hydrocarbons can be achieved with only small increases in NOx by means that do not imply appreciable changes in the size, weight, or complexity of the gas turbine engines.

49643 **APTIC NO. 71969**

Eckert, John S. and Ralph F. Strigle, Jr.

PERFORMANCE OF WET SCRUBBERS ON LIQUID AND SOLID PARTICULATE MATTER. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 68-81. 3 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

The effectiveness of packed scrubbers for particulate collection is discussed. Experiments with the collection of ammonium chloride fumes consisting of particles ranging from less than 0.1 micron to 3 micron indicated a 60% removal capability for a cocurrent packed test tower using a bed of 1-inch plastic Intalox saddles with 3 ft of depth. Tests of the tower using ball clay showed collection efficiencies of 98% for 0.10-0.25 micron particles. The efficiencies fell slightly with an increase in particle size until 1 micron in diameter was reached; at this point the collection efficiency was 98.7%. Collection efficiencies for particles over 5 micron approached 100%. Liquid entrainment separation data were also collected.

49644 **APTIC NO. 72119**

Eguchi, Koji

EXAMPLES OF DUST REMOVAL DEVICES FOR WOOD CHIP-FUEL OIL MIXED COMBUSTION BOILERS - BAG FILTERS. *(Kikuzu, juyu konsho boira no baijin jokyo sochi no shiyorei - bagu firuta). Text in Japanese. Mokuzai Kogyo (Wood Ind.), 29(351):24-29, Oct. 1974.*

A push-in type bag filter was used for the removal of dust from a boiler having a capacity of 18 tons/hr. The boiler used wood chips at 2.5 tons/hr as main fuel and A heavy oil at 300 l/hr. The flue gas was emitted 1000-1300 cu m/hr at 280 deg. The bag filter had a total area of 1100 sq m with heat-proof cloth as the filtering material. The removal of dust from the bag filter was by the inverse flow method and the dusts wer ejected by rotary valve. The incoming gas contained 3.5 g/N cu m dust and the outgoing gas had dust concentration lower than 0.05 g/N cu m. Despite a spark removing box being equipped before the bag filter, the filter cloth was burned. Other problems included the increase of pressure loss due to variation of boiler load and short life of filter cloth.

49645 **APTIC NO. 72013**

Eskelund, Gerald R. and Allan F. Burns

POLLUTION ABATEMENT IN ARMY EXPLOSIVES PRODUCTION. *In: Proceedings of the First Conference on the Environmental Effects of Explosives and Explosions (May 30-31, 1973) (Final Report) Naval Ordnance Systems Command Proj. F53-554, Task ORD-332-005/UF 53-554-301, Program Element 62755N, NOLTR 73-223, p. 15-32, Feb. 1974.*

NTIS, DDC: AD 777 403

The sources and control of nitrogen oxides pollution in Army manufacture of explosives and propellents is described and open burning is discussed. Manufacturing operations for trinitrotoluene (TNT) produce 13,000 lb/day of NOx for 4 plants. These fumes contain contaminants such as mononitrotoluene and tetranitromethane. Sources of NOx pollutants common to most of the manufacturing operations include nitrocellulose and TNT operations, and acid production. Two NOx abatement techniques under study for Army use are molecular sieve adsorption and scrubbing. The molecular sieve system was applied to a nitric acid facility at Holston Army Ammunition Plant. This NOx stream is free from organic contaminants. Emission levels are expected to be below 50 ppm. The NOx can be recovered as nitric acid and reused. Acid and fume recovery NOx cannot be removed by molecular sieves due to the mononitrotoluene and tetranitromethane present. Scrubbing techniques are used to remove and recover the NOx, as well as destroy or remove the organics present.

49646 **APTIC NO. 75106**

Fan, L. T.

MATHEMATICAL SIMULATION OF AN ADSORBER FOR POLLUTANT REMOVAL. *Kansas State Univ., Manhattan, Environmental Protection Agency Grant R-800316, Program Element 1AB015, ROAP 21AXM-061a, Rept. EPA-650/2-74-110, 95p., Oct. 1974. 110 refs.*

NTIS: PB 239331/AS

An extensive survey of the literature on the design and operation of fluidized bed adsorbers for gaseous pollutant removal is provided along with available mathematical models for adsorption processes. A simulation of an adiabatic adsorber based on an axial dispersion model with external mass transfer rate control and a Langmuir type isotherm is also presented. Numerical values of the dynamic adsorbate concentrations and temperature at various positions of a packed bed adsorber are obtained by means of a Crank-Nicolson implicit method. Two schemes are proposed for operating a single fixed bed to remove a gaseous pollutant continuously. One uses fresh air for desorption, and the other uses exhaust gas. Generally, the pollutant is adsorbed at a temperature lower than it is desorbed. A computer simulation is used to study the effects of several parameters on the asorber performance. (Author abstract modified)

49647 **APTIC NO. 71819**

Fes kov, M. I. and A. N. Kurdyukov

INCREASING THE DUST SEPARATION EFFICIENCY BY WATER SPRAY DURING THE OPERATION OF COAL COMBINES. *(O povyshenii effektivnosti pylepodavleniya orosheniyem pri rabote ugol nykh kombaynov). Text in Russian. Ugol, 8(581):57-59, Aug. 1974.*

Possibilities of efficient wet dust separation around coal combines and their working members are described. The water consumption for dust separation around working members ranges from 0.3 to 1 l/cu m dust-laden air. The working member can be isolated from its surroundings by plastic walls or shields, while water or air curtains are rather unreliable. Such isolation requires a considerable increase in the water expenditure to improve the wettability of the coal particles by humidifying the air. Laboratory experiments revealed improved wettability and sedimentability of coal particles in humid air.

49648 **APTIC NO. 72179**

Festner, Theodor

ELECTROSTATIC AGGLOMERATION APPARATUS. *(Assignee not given.) U. S. Pat. 3,826,063. 5p., July 30, 1974. 15 refs. (Appl. May 21, 1973, 3 claims).*

An electrostatic agglomeration apparatus for use in conjunction with conventional air filtering and conditioning systems is described that increases the limited fine particle filtering ability of such systems. The agglomeration apparatus consists of an air duct with a pair of channels disposed either within or adjacent to the duct. The channels open into the duct at both ends. Several electrically conductive rods are situated inside the channels and are charged electrically positive in one channel and negative in the other channel such that particulate matter flowing into the channels is ionized. Particle agglomeration occurs with the resultant formation of larger particulate masses which are more easily filterable. (Author abstract modified)

49649 **APTIC NO. 72330**

Fink, Ferdinand

ELECTROTHERMAL GASIFICATION OF TRASH. *(Elektrothermische Vergasung von Hausmell). Text in German. Dechema Monograph., 75(1452-1485):485-493, 1974.*

When domestic wastes are treated at reducing conditions at high temperatures, a combustible waste gas and a ferrometal are obtained. This process can be carried out in a hot arc furnace with a liquid slag layer of the type used in steel making, provided that the furnace is properly equipped for continuous feeding of the wastes and for removing the resulting waste gas. The fiercely radiant heat of the furnace dries and breaks up the domestic waste very rapidly to give gas and residual coke. The ash melts rapidly and forms a liquid layer covering the molten metal. At the same time it reacts with the residual coke and a ferrometal results. The waste gas can be used as a fuel and the ferrometal in the oxygen blowing steel making process. The economics of this process are surprisingly good. Therefore, electrothermal waste gasification is superior to conventional waste incineration. In addition, any solid waste can be treated by this all devouring process. This ultra-clean process allows true recycling.

49650 **APTIC NO. 71793**

Frendl, Geza

ENVIRONMENTAL HAZARDS AND ENVIRONMENTAL PROTECTION IN SYNTHETIC FIBER MANUFACTURE. *(A muszalgyrartas kornyezeti artalmai es a kornyezetvedelem). Text in Hungarian. Tatabanyai Szenbanyak Muszaki-Kozgazdasagi Kozl., 14(2-3):102-104, April-Sept. 1974.*

Air pollution problems and possibilities for air pollution abatement in synthetic fiber manufacture are described. Viscose fiber manufacturing processes should have closed technological cycles to prevent carbon disulfide and hydrogen sulfide emissions. As condensation, adsorption on activated carbon, and adsorption in liquids are expensive, exhaust and discharge through 80-100 m-high stacks is the best solution. Air pollutants generated during polyamide fiber manufacture can be easily removed from the air by condensation or scrubbing with water. The emission of unsaturated low-molecular hydrocarbons during polypropylene fiber manufacture can be efficiently controlled by technological cooling of the fibers. Dimethylformamide generated in polyacrylonitrile fiber production can be captured efficiently by scrubbing with water, while acrylonitrile emissions are practically nonexistant due to the closed-cycle process.

49651 **APTIC NO. 71984**

Freshwater, D. C.

PARTICLE CAPTURE AND REMOVAL. *Loughborough Univ. of Technology (England), Leverhulme Project, Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-18. 3 refs. (Jan. 7-8.)*

Particle capture and removal mechanisms are examined in relation to fiber filters. The overall efficiency of capture is equal to the efficiency for the inertia mechanism plus some constant times the efficiency due to field forces (diffusion and electrostatics). Inertia is the predominating factor for particles greater than 1 micron in diameter, while electrostatics and diffusion are the primary factors governing capture of particles less than 2 micron and 0.1 micron, respectively. Experiments with test dusts of 5-15 micron in diameter fed through a vibratory feeder sheared by a jet of compressed air in a dispersion unit and then through a filter consisting of metallic fibers indicate a discrepancy between theoretical predictions of particle removal and experimental results for particles larger than 3-4 micron. The discrepancy is accounted for by the phenomenon of bounce-off. An examination of bag filter operation reveals two mechanisms of particle capture. Although the bag device operates as a fibrous filter, it also appears to act as a sieving device.

49652 **APTIC NO. 72240**

Fujii, Minoru

IGNITION DEVICE FOR 2 CYLINDER INTERNAL COMBUSTION ENGINE. *(2 kito nainen kikan-yo tenka sochi). Text in Japanese. (Nihon Denso Co., Ltd., Kariya (Japan)) Japan. Model Util. Sho 49-42499. 6p., Nov. 20, 1974. (Appl. Dec. 16, 1970, 1 claim).*

A condenser charge-discharge type ignition device for a 2 cylinder internal combustion engine was designed to provide stabilized ignition for complete combustion, thereby increasing the engine output and reducing the amount of toxic components in the exhaust gas. The device consists of an ignition coil placed in each cylinder, a rectifier with control pole connected in series to the primary winding of the ignition coil, and a magnetic generator as power source for charging condensers, in which the charge of the condenser in the ignition side is discharged by connecting the rectifier and primary winding of the ignition coil. To the above-mentioned magnetic generator, two coils for charging condensers are attached so that one condenser is charged while the other condenser is being discharged.

49653 **APTIC NO. 72256**

Furutani, Masao

FILTER CLOTH FOR DUST COLLECTOR. *(Shujinki rofu). Text in Japanese. (Nihon Setsubi Industry Co., Ltd. (Osaka, Japan)) Japan. Model Util. Sho 49-45022. 2p., Dec. 9, 1974. (Appl. May 19, 1971).*

The use of asbestos as filter material for dust collectors is described. One or more asbestos sheets are sandwiched between two stainless steel screens and the two screens are bound by metal strings. This can be used as ordinary filter material for any dust collector which uses a filter cloth. By selecting the proper diameter of the stainless steel and metal strings, high temperature air up to 1200 C can be withstood. Since glass fibers can be used only up to 250 C, the asbestos filter is very useful for cleaning hot air (temperature higher than 250 C).

49654 **APTIC NO. 71772**

Fusamura, N., S. Nagoya, S. Oya, T. Takada, S. Furuta, and T. Fujii

EFFECTS OF COVERING CONDITIONS ON THE SUPPRESSION OF LEAD FUME FROM MOLETEN CU-PB ALLOYS. *(Doki nigen gokin no fuyyumu yokusei ni oyobosu himaku joken no eikyo). Text in Japanese. Imono (Foundry), 46(8):761, Aug. 1974.*

The suppression efficiencies of clays and calcium carbonate for lead fume generation from a molten copper-lead alloy were studied. Twenty kg of Cu-Pb alloy (10% Pb) was placed in a carbon crucible and heated to 1200 C. The generated lead fume was trapped with filter paper and quantitized by colorimetry using dithizone. The materials tested were applied at 23.5 mm thickness on the alloy surface, and then heated. At a temperature of 1150 C, the generated fume was 30 and 20 micrograms/min for calcium carbonate and a clay, while it was 60 micrograms/min when the alloy itself was heated. When the alloy surface was covered with calcium carbonate and calcium carbonate was further covered with the clay in the ratio five to one, the generated fume was 5.5 micrograms/min at 1150 C. These coverings suppressed lead fume generation more effectively than a mixture of clay and calcium carbonate. The type of clay also affected the suppression efficiencies. Both thickness of the covering layer and mesh size of the covering material affected the fume generation, and a higher efficiency was observed when the thickness was increased or smaller particle size was used.

49655 **APTIC NO. 71968**

Gardenier, H. E.

SUBMICRON PARTICULATE SCRUBBING WITH A TWO PHASE JET SCRUBBER. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 33-53. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

A two-phase jet scrubbing system that utilizes waste thermal energy to provide the operating power for a two-phase jet which simultaneously cleans and induces the necessary draft is described. The most direct application of the scrubbing system is to control particulates emitted from processes generating high temperature gases. If the process off gas is at a temperature of 800 F or above, an economizer type of heat exchanger can be used to transfer thermal energy from the gas to pressurized hot water which is delivered to the heat exchanger by a pump. Water exiting the heat exchanger is delivered directly to the nozzle in its liquid state. Field tests indicate excellent cleaning performance with particulates as small as 0.10 micron. The normal venturi liquid to gas ratio is in the range of 10-15 gallons of water per 1000 cu ft of gas. Collection efficiencies generally around 99% are achieved with this ratio. Operating cost data for the scrubber reveal substantial reductions compared to other types of scrubbing systems.

49656 **APTIC NO. 71623**

Glowiak, Bohdan and Adam Gostomczyk

STUDIES CONCERNING THE SORPTION OF FLUORINE COMPOUNDS ON ION EXCHANGERS. *(Untersuchungen ueber die Sorption von Fluorverbindungen auf Ionenaustauschern). Text in German. Staub, Reinhaltung Luft, 34(12):442-445, 1974. 9 refs.*

After successful laboratory experiments with anionic ion exchangers concerning sorption of hydrogen fluoride, experiments were carried out in a hydrofluoric acid production plant. The plant emitted 600 cu m waste gas/hr containing .0002-.0006 kg HF/cu m. Through the experimental set-up 300 cu m gas/hr were drawn. The waste gas entered the column which was equipped with two polyethylene grids with an average mesh width of 3mm. The grids carried two layers of anionic ion exchanger with a granulation of 4 to 6mm. The anionic ion exchanger was sprayed with a 4% NaOH solution. The method is suitable for use as a third cleaning stage succeeding the sorption of HF and silicon tetrafluoride in water and in an aqueous Fluosilicic acid solution, cleaning the gases to a residual HF concentration of .00001 kg/cu m.

49657 **APTIC NO. 72121**

Gulacsy, Bela, Erno Luptak, and Ferenc Taller

INFLUENCE OF CENTRAL HEATING PLANTS ON AIR QUALITY. *(Futoeromuvek letesitesenek hatasa a levegotisztasgra). Text in Hungarian. Energiagazdalkodas, 15(10):444-449, Oct. 1974. 7 refs.*

Effects of heating power plants on air quality are described. Domestic and institutional heating equipment with their low-level emission sources are chiefly responsible for sulfur dioxide, dust, soot, and nitrogen oxides emissions in urban agglomerations. While flue gas desulfurization is presently unfeasible, fly ash and dust can be separated by electrostatic precipitators. Although a switch to low-sulfur or no-sulfur fuels substantially reduces the SO2 emissions, the adoption of remote heating by means of large-capacity heating power plants represents the best solution in the long run. Such power plants are able to dilute their emissions by the use of 200 to 300 m high stacks. Gas turbine type heating power plants are most advantageous ecologically as they use low-sulfur or no-sulfur fuels, and generate less nitrogen oxides than other power plant types. In addition, the nitrogen oxides are diluted by cooling air a great degree, which permits the use of lower stacks. The nitrogen oxides emission can be further reduced by the injection of steam rates over 1.3%.

49658 **APTIC NO. 71718**

Hakka, Leo Ernest

SULPHUR REMOVAL FROM NATURAL GAS. *(Union Carbide Canada Ltd., Toronto (Ontario)) U. S. Pat. 3,826,811. 2p., July 30, 1974. 3 refs. (Appl. July 12, 1971, 4 claims).*

A process for the removal of sulfur from sour natural gas is described which overcomes prior-art disadvantages of flammability, atmospheric pollution, and the need for flaring. The process consists of contacting the gas at a temperature above 60 C with an aqueous solution of 5-50 wt% monoethanolamine and then separating the sulfur-laden solution from the gas. The process is particularly applicable to natural gas wells.

49659 **APTIC NO. 75090**

Harwood, Colin F., Paul Siebert, and Thomas P. Blaszak

ASSESSMENT OF PARTICLE CONTROL TECHNOLOGY FOR ENCLOSED ASBESTOS SOURCES (FINAL REPORT). *IIT Research Inst., Chicago, Ill., Environmental Protection Agency Contract 68-02-1353, Program Element 1AB015, ROAP 21AFA-006, Rept. C6291-11, EPA-650/2-74-008, 135p., Oct. 1974. 82 refs.*

NTIS: PB 239926/AS

The state of the art in asbestos emission control was assessed based on information obtained from a literature survey, contact with users, and field tests conducted to obtain emissions data at five different enclosed manufacturing sources. Baghouses are the predominant control device used in the asbestos industry, with cotton bags being used most frequently. Automatic shaking is employed in most baghouses, with shake cycles of 1.5-4 hr being most common. Most baghouses operate at two pressure drop ranges, 2.5-5 and 7.5-10 cm water. Air-to-cloth ratios range from 2-10:1. Published data on the removal efficiencies of the control devices is either non-existent or quoted in general terms. During the testing of five baghouses at asbestos manufacturing facilities, mass efficiencies were quite high (99% and over), though fiber concentrations exceeding 100 million fibers/cu m were measured for fibers greater than 0.05 micron long. Computer modeling indicates that even for one source asbestos concentrations of over 500 fibers/cu m can be anticipated 5 km from the source.

49660 **APTIC NO. 72320**

Hartman, Miloslav

POSSIBILITIES OF THE DRY LIMESTONE METHOD FOR DESULPHURIZATION OF COMBUSTION PRODUCTS. *(K moznostem suche vapencove metody na odsireni spalin). Text in Czech. Chem. Prumysl (Prague), 25(50):14-18, 1974. 21 refs.*

The chemistry of stack gas sulfur dioxide removal by dry limestone processes is reviewed. Sulfur dioxide reacts quickly at high temperatures with particulate calcium oxide formed by the decomposition of limestone to give calcium sulfate and traces of calcium sulfite as reaction products. The reaction rate drops quickly with increasing conversion of the calcium oxide, and the reaction essentially stops before the entire amount of calcium oxide is consumed. The maximum attainable conversion of calcite varies according to locality or origin, the partial pressure of the SO2, and the particle diameter of the calcium oxide; conversion is generally less than 50%.

49661 **APTIC NO. 72278**

Hasegawa, Yoshikazu and Noboru Takanari

GASIFICATION-DESULFURIZATION OF HEAVY FUEL OIL - EQUILIBRIUM STUDY ON THE ABSORPTION OF HYDROGEN SULFIDE AND CARBON DIOXIDE WITH HOT POTASSIUM CARBONATE SOLUTION. *(Jushitsu yu gasuka datsuryu). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Daiichi Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. (No. 1) Electric Power Ind., Rept.), no. 73125:27p., July 1974. 3 refs.*

Equilibrium studies of the selective absorption of hydrogen sulfide and carbon dioxide with hot potassium carbonate solution (100-150 C) were performed to investigate conditions favoring the gasification and desulfurization of heavy fuel oil. Hydrogen sulfide and carbon dioxide concentrations increased with increasing absorption temperature decreased with increasing absorption pressure. Increasing the absorption temperature within the allowable hydrogen sulfide content resulted in the most desirable conditions for absorption with potassium carbonate solution. The liquid composition range allowing for an equilibrium hydrogen sulfide content of less than 0.01% was limited by increasing the absorption temperature and broadened by increasing the absorption pressure. With the same liquid composition, the partial pressure ratio of hydrogen sulfide to carbon dioxide at the vapor-liquid equilibrium decreased with increasing absorption temperatures. Thus, the gasification-desulfurization process is favored by high temperature absorption and low temperature regeneration.

49662 **APTIC NO. 72186**

Hass, Robert H.

EXHAUST GAS CONVERSION PROCESS. *(Union Oil Co. of California, Los Angeles) U. S. Pat. 3,832,443. 5p., Aug. 27, 1974. 5 refs. (Appl. Aug. 26, 1971, 10 claims).*

A method for the catalytic conversion of nitrogen oxides, hydrocarbons, and carbon monoxide in the exhaust of internal combustion engines is described that overcomes prior art problems relating to first stage catalyst deactivation and eliminates the need for exhaust gas recycling. The exhaust gas is passed at a temperature of above 700 F through a contacting zone containing an oxidation-reduction catalyst that consists of at least one easily reducible oxide of a multivalent transitional metal. Air is injected into the flow path of the exhaust gas at several points in the contacting zone to establish a downstream zone where net oxidizing conditions prevail and an upstream reducing zone. The oxygen concentration of the exhaust gas is increased gradually in the downstream direction of the coversion zone in order to maintain a generally increasing O2/CO mole ratio in the initial section of the conversion zone. The O2/CO ratio in the initial section is less than stoichiometric, while the O2/CO ratio in latter part of the conversion zone is greater than stoichiometric.

49663 **APTIC NO. 71828**

Hatanaka, Toshiki and Takatoshi Kodama

LOW NOX BURNER OF CHUGAIRO INDUSTRIAL CO. *(Chugairo kogyo no tei NOx bana). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(12):33-36, Dec. 1974.*

Three types of low nitrogen oxides burner were developed. An NPL low air pressure kerosene burner reduced flame temperature and oxygen by improving gas circulation. Test results of 4 NPL burners showed about 35% NOx reduction compared to conventional burners. LPG burners having the functions of waste gas recycling, flame partition, two-stage combustion and high-speed combustion reduced up to 50% NOx at about 2% O2. A continuous heating furnace using heavy oil was converted to a butane-burning furnace with nozzle mix gas burner. Test results showed possible application as a small-scale burner.

49664 **APTIC NO. 71972**

Hesketh, Howard E.

FINE PARTICLE COLLECTION EFFICIENCY RELATED TO PRESSURE DROP, SCRUBBANT AND PARTICLE PROPERTIES AND CONTACT MECHANISM. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 109-127. 5 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

Collection efficiencies for the control of fine particles with venturi scrubbers are analyzed as a function of pressure drop, throat area, and liquid to gas ratio. A relationship of pressure drop to throat area, gas density, throat velocity, and liquid to gas ratio is developed and used to provide a method for estimating efficiency. Fine particle collection efficiency in a venturi scrubber appears to be closely related to scrubber throat pressure drop. An equation is also given for charged particles which have a greater collection efficiency. Wetting agents can also improve the collection efficiency, with dust loadings being reduced by as much as 50%. (Author abstract modified)

49665 **APTIC NO. 72178**

Higgins, Frank

DOUBLE-WALL FILTER BAG CONSTRUCTION. *(Summit Filter Corp., Summit, N. J.) U. S. Pat. 3,826,066. 6p., July 30, 1974. 10 refs. (Appl. June 15, 1973, 4 claims).*

A double-wall filter bag arrangement that increases the effective filter area is described. The unit includes an inner bag surrounded coaxially by an outer bag, with the bags interconnected at one end to form a closed bottom plenum chamber. Both the interior surface of the outside bag are exposed to the dust-laden gas. Solids are retained by the two surfaces, while the clean gas flows into the annular space between the bags and exits from the top of the unit. The construction provides for a greatly increased filter material area in relation to the overall size of the unit. The increased air to cloth ratio and decreased air flow velocity obtained with the unit result in an increased cleaning efficiency even when the unit is 60% smaller in size than conventional filter bags. (Author summary modified)

49666 **APTIC NO. 72266**

Hioki, Kazuo and Michio Onoda

IGNITION SYSTEM FOR AN AUTOMOTIVE ENGINE HAVING EXHAUST RECIRCULATION ARRANGEMENT. *(Nisson Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,828,752. 6p., Aug. 13, 1974. 4 refs. (Appl. Nov. 28, 1972, 3 claims).*

An improved ignition system for use in conjunction with exhaust gas recirculation control of nitrogen oxides from internal combustion engines is described that, unlike prior-art arrangements, selectively utilizes two high-tension current generators. An additional high-tension current generator is connected in parallel with the usual high-tension current generator between the ignition power source and the ignition distributor. An electrical switching means is provided to automatically activate the additional high-tension current generator when the exhaust gas recirculation system is operative so that the air-fuel mixture is fired with intensified energy.

49667 **APTIC NO. 71564**

Hoehn, F. W. and M. W. Dowdy

FEASIBILITY DEMONSTRATION OF A ROAD VEHICLE FUELED WITH HYDROGEN-ENRICHED GASOLINE. *Preprint, 10p., 1974. 13 refs. (Presented at the Intersociety Energy Coversion Engineering Conference, San Francisco., Aug 26-30, 1974.)*

Emission tests were performed on a conventional internal combustion engine modified to use a hydrogen-enriched gasoline mixture to allow for burning at ultralean mixtures. Both multicylinder engine dynamometer tests and vehicle tests (Federal Test) were performed. The modified vehicle showed carbon monoxide emissions of 1.5 g/mi, nitrogen oxide emissions of 0.5 g/mi, and hydrocarbon emissions of 2.6 g/mi as compared with the 1977 Federal standards of 3.4, 0.4, and 0.41 g/mi, respectively. Thus, the 1977 CO standard was met, and the 1977 NOx standard nearly met. The increased hydrocarbon emissions observed after modification illustrated the need for further research to develop effective methods of control. The hydrogen requirement to avoid engine misfire at ultralean conditions was about 15% by weight of the gasoline. Performance and drivability of the modified vehicle were satisfactory.

49668 **APTIC NO. 71683**

Hoffman, Gordon H. and Charles Philipp Brundrett

METHOD OF PREPARING EXHAUST CATALYST. *(Grace (W. R.) and Co., New York) U. S. Pat. 3,826,758. 3p., July 30, 1974. 4 refs. (Appl. May 25, 1972, 5 claims).*

A method of preparing a catalyst for treating internal combustion engine exhausts is described that results in a product characterized by excellent crushing strength and improved resistance to shrinkage. The method is applicable to catalytic systems containing copper oxide, chromic oxide, manganese dioxide, and palladium on a porous support. The support, which may be activated alumina, is impregnated with a manganese salt-palladium salt solution and then dried and subsequently activated by calcination of 1300-1500 F. The impregnation is carried out such that the catalyst consists of about 2-6 wt% copper oxide, 6-10 wt% chromic oxide, 6-8 wt% manganese dioxide, and 0.01-0.05 wt% palladium.

49669 **APTIC NO. 72183**

Hollins, Jesse R.

INTERNAL COMBUSTION ENGINE CRANK CASE OIL VAPOR CONDENSING MEANS. *(Assignee not given.) U. S. Pat. 3,828,744. 4p., Aug. 13, 1974. 7 refs. (Appl. April. 19, 1973, 1 claim).*

An apparatus for condensing crankcase oil fumes and thus minimizing the amount of oil vapors fed in the air filter of an internal combustion engine is described that reduces engine carbonization problems associated with prior art positive crankcase ventilation systems. A tube that communicates the space below the engine valve cover with the intake manifold is cooled with a condenser so that oil vapors which pass through the tube form oil droplets. The tube is oriented so that the oil droplets drip back through the valve corner, thus minimizing the amount of oil vapor transferred to the air filter housing.

49670 **APTIC NO. 72072**

Hortman, Norman A.

CENTRIFUGAL SEPARATOR HAVING AXIAL-FLOW VORTEX GENERATOR. *(Assignee not given.) U. S. Pat. 3,813,854. 4p., June 4, 1974. 6 refs. (Appl. July 7, 1972, 4 claims).*

A centrifugal separator for removing particulate matter entrained in moving gas streams (e.g., stack gases, automobile exhausts) is described which uses an airfoil device to generate the required vortex action. The present invention overcomes the spatial limitations and back-pressure considerations associated with tangential-flow separators. The axial-flow separator consists of a hollow cylinder which is provided with coaxial inlet and outlet zones and with an airfoil means in the inlet zone for generation of the vortex. The airfoil extends radially into the inlet zone and terminates in a tip located at the center of the flow stream of thy medium. The leading edge of the airfoil faces upstream. As the medium flows across the airfoil, a vortex is generated downstream of the tip and inside the generator. A continuous helical vane extends between the inlet and outlet zones and is pitched to continue the rotation of the medium in the separator. A layer of porous material lines the interior of the separator to collect separated particulate matter. In one embodiment of the invention, the velocity of the medium flowing across the airfoil is maintained by means of an axial flow fan located in the outlet zone. A venturi-shaped insert the mounted inside the separator. (Author abstract modified)

49671 **APTIC NO. 71796**

Horvath, Zoltan and Jozsef Weber

ENVIRONMENTAL PROTECTION IN ALUMINUM INDUSTRY. *(Kornyezetvedelem az aluminiumkohaszatban). Text in Hungarian. Banyasz. Kohasz. Lapok - Kohaszat, 107(9):399-404, 1974. 7 refs.*

Emission sources in the aluminum industry, and possibilities of air pollution abatement are described. Red mud dumps, when dried out, represent a major source of alkaline dust emissions. Calcining plant waste gases, containing sulfur dioxide, carbon monoxide, and red mud particles are cleaned in a system composed of a dust chamber, multicyclone, and electrostatic precipitator. The flue gas SO2 content can be abated by the use of natural gas or low-sulfur fuel oil and by combustion air preheat. The fluorine, tar, and carbon monoxide emissions from electrolyzers can be abated by the adoption of closed-cycle technology, and wet or dry gas cleaning. In wet gas cleaning, the carbon, tar, and carbon monoxide present in the waste gases are incinerated, after which most of the soot and dust are separated in a cyclone. Further cleaning is done in an electrostatic precipitator and wet scrubber. Scrubbing can be done with water, or by acid and alkaline solutions used consecutively. Dry gas cleaning by means of alumina fluidized beds and bag filters reaches efficiencies of 99.9%.

49672 **APTIC NO. 71944**

Howitt, J. S. and T. C. Sekella

FLOW EFFECTS IN MONOLITHIC HONEYCOMB AUTOMOTIVE CATALYTIC CONVERTERS. *Preprint. Society of Automotive Engineers, Inc., New York, 11p.,* *1974. 12 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974, Paper 740244.)*

Durability tests of monolithic catalytic converters were made with mechanical devices used to tailor the exhaust gas flow. Deflectors of several different shapes can extend the useful life of the converter by improving conversion efficiencies of hydrocarbons and carbon monoxide. Tests were run on engine/dynamometers with round cross-sectional area samples and with symmetrical inlet cones. Improvements were found in initial activity and reduced deterioration. The penalty for altering the flow is in slower catalyst light-off and increased pressure drop. Sequential photographs of catalyst light-off with different flow distributions are included as well as postmortem analysis of catalyst loading and poison deposition. The potential benefits result from a more balanced exhaust gas flow over the monolith cross section. (Author abstract modified)

49673 **APTIC NO. 72071**

Hunt, Duane A.

INTERNAL COMBUSTION ENGINE CONTROLS FOR REDUCED EXHAUSTS CONTAMINANTS. *(Donnell R. Matthews, Jr., East Lansing, Mich.) U. S. Pat. 3,818,877. 7p., June 4, 1974. 12 refs. (Appl. Aug. 17, 1972, 18 claims).*

An electrochemical control system for achieving optimum efficiency in the catalytic conversion of hydrocarbon and carbon monoxide emissions from internal combustion engines is described. The system automatically maintains catalyst temperature at a point for maximum pollutant conversion by adjusting ignition timing and fuel/air ratio during warm-up and subsequent operation. Ignition timing is retarded during engine warm-up to bring the catalytic converter to an efficient operating temperature within a minimum period of time. After the converter reaches a predetermined minimum temperature, the spark is advanced to within its normal operating range. A needle-valve adjustment during warm-up is employed to enrich the fuel/air mixture by approximately 10%. Following warm-up and attainment of a predetermined catalyst temperature, the needle valve is moved automatically to its normal position (e.g., a fuel/air ratio of 16:1). Although the normal lean mixture causes increased amounts of nitrogen oxide emissions, present NOx converters appear capable of handling the increased emissions under normal operating conditions.

49674 **APTIC NO. 69215**

Ichikawa, Michio

STEPS TO A CLEAN ENVIRONMENT. *(Seijo na kankyo kaifuku eno te teigen). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(11): 58-59, 1974.*

The future environment was considered both from the points of limited quantity of natural resources and pollution. A cleaner environment could be attained at the expense of larger consumption of natural resources, while lesser fuel consumption could be achieved at the expense of a polluted environment. To compromise between these alternatives the establishment of a central steam suppling system was suggested for an industrial area. The incineration facilities as well as power plants were situated in the same location, and their excess steam and heat would be utilized for the central steam supplying system. The air pollution caused by these facilities may then be treated by one large facility for air pollution control. Public awareness of environmental pollution should begin with early education.

49675 **APTIC NO. 72373**

Idemura, H.

NEW FLUE GAS DESULFURIZATION PROCESS. *Dechema Monograph., 75(1452-1485):109-130, 1974.*

Regulations on sulfur oxide emissions from the combustion of fuels, especially high sulfur coal and residual fuel oil, are becoming increasingly restrictive, and various methods of flue gas desulfurization have been proposed. A satisfactory flue gas desulfurization plant must meet several basic requirements. Construction and operating costs must be low, the plant must be capable of stable continuous operation over a long period, and safety and ease of operation are essential. Unfortunately the lime scrubbing and other wet flue gas desulfurization processes do not completely satisfy all these requirements; one problem is clogging of the scrubbing column. Plants based on the new process developed by Chiyoda Chemical Engineering and Construction Co. meet all the requirements of a satisfactory flue gas desulfurization plant and four industrial plants based on the new process are now being operated in Japan with satisfactory results.

49676 **APTIC NO. 71762**

Iizuka, Y.

COMBUSTION CHAMBER APPARATUS FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan no nenshoshitsu sochi). Text in Japanese. (Honda Giken Ind. Co., Ltd., Tokyo (Japan)) Japan Model Util. Sho 49-46324. 2p., Dec. 18, 1974. (Appl. Oct. 25, 1971).*

A device for a supporting combustion chamber in internal combustion engines is described. A small hole connects the supporting and main chambers. The spark plug in the supporting chamber is covered with a U-shaped metal which prevents the tip of the spark plug from being wetted by the fuel injected into the chamber and also prevents misfiring when the gas from the main chamber flows into the supporting chamber upon compression. The U-shaped metal is cooled by externally circulated water, which extends the life of the engine.

49677 **APTIC NO. 71760**

Inoue, M. and K. Suzuki

CARBURETOR. *(Kikaki). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama (Japan)) Japan Model Util. Sho 49-42497. 2p., Nov. 20, 1974, 1 ref. (Appl. Dec. 30, 1970).*

A device for the carburetor during cold engine operation is described. It consists of bypassing air line to the bottom of the throttle valve in the carburetor from the outside and an electrically operated solenoid valve placed in this air line. The solenoid valve is operated by a thermostat (which may be on the engine body or in the radiator water). When the engine is cold, the solenoid valve is activated and closes the air line and the fuel-rich gas mixture enters the combustion chambers. When the engine becomes hot, the valve opens the air line allowing extra air to flow into the combustion chambers.

49678 **APTIC NO. 71695**

Isahaya, Norio

EXHAUST GAS CLEANING METHOD. *(Haigasu joko hoho). Text in Japanese. (Hitachi Manufacturing Co., Ltd., Tokyo (Japan)) Japan Pat. Sho 49-49288. 3p., Dec. 26, 1974. (Appl. Aug. 6, 1971, 1 claim)*

Waste gases containing harmful substances such as sulfur dioxide can be purified by absorption. Waste gas at 150 to 200 deg was introduced to a drying tower in which 15 to 20% sodium sulfite solution was sprayed from a spray nozzle. Water was evaporated by the heat of the waste gas and solid Na_2SO_3 was removed as by- product. The sodium sulfite solution to the drying tower was supplied from an absorption tower where SO_2 was absorbed with 10% sodium hydroxide solution. The rate of desulfurization was as high as 95%. The method has the advantage of no secondary pollution by waste liquid.

49679 **APTIC NO. 71761**

Ishii, Naoyuki

FUEL CONTROL APPARATUS OF CARBURETOR IN DECELERATION. *(Kikaki no teisoku nenryo seigyo sochi). Text in Japanese. (Keihin Fine Machinery Manufacturing Co., Ltd., Kawasaki (Japan)) Japan. Model Util. Sho 49-42498. 2p., Nov. 20, 1974. 3 refs. (Appl. Oct. 5, 1967).*

A fuel control valve for carburetors during deceleration operation is described for fuel conservation. The device cuts off the fuel supply to the cylinder during deceleration. The control valve is regulated by a magnetic switch, and the electrical current to the switch is controlled through a device sensible to the pressure difference to both sides of the throttle valve in the carburetor. When the cylinder becomes lower in pressure than the atmospheric pressure, the pressure activates the electrical current switch, thus activating the magnetic switch to close the fuel control valve. The device also prevents the engine from running after the ignition key is disconnected.

49680 **APTIC NO. 72345**

Isogai, Masahira and Takeshi Sugita

LATER STAGE TREATMENT APPARATUS FOR DUST. *(Dasuto no saishu shori sochi). Text in Japanese. (Daito Boki Manufacturing Co., Ltd., Osaka (Japan)) Japan. Model Util. Sho 49-45023. 4p., Dec. 9, 1974. (Appl. May 22, 1971).*

A filtering facility for large scale air cleaning of cotton waste and light dusts is described. The equipment can remove the accumulated dusts from the outside; thus, no manpower is necessary to remove those accumulated dusts by entering into the filter room, and continuous operation can be achieved. An air deflector plate installed at the air inlet adjusts the direction of air flow and a sloped plate catches the falling dusts which are blown to a dust collection cavity by diffused air flow. The collected dusts can be removed from the cavity or they can be further transferred by a belt conveyor. A compressor can also be used during the dust transportation to give the dust higher density, which makes it easier to handle.

49681 **APTIC NO. 68223**

Jackson, Robert G.

THE ROLE OF METHANOL AS A CLEAN FUEL. *Preprint, Society of Automotive Engineers, Inc., New York, 6p., 1974. 5 refs. (Presented at the Society of Automotive Engineers, Mid-Continent Section, Oct. 27, 1973.)*

Various coal gasification schemes as alternatives to the direct combustion of coal are reviewed, with particular emphasis on the use of methanol as a clean fuel. Among four alternative routes that can be taken following the gasification of coal so as to produce a synthesis gas which after cleanup can be converted to either gaseous or liquid products, only the solution refining or methanol process can produce a fuel usable over the whole range presently supplied by petroleum. Methanol has the additional advantage that it can be used without any further processing and be produced using available components from existing processes. Examples of possible methanol uses include: boiler fuel applications with little or no modification, gas turbine fuel applications where clean methanol combustion gives higher efficiency, vehicle fuel applications with slight modifications to the fuel system, fuel cell applications where the energy can be converted directly, application as a liquid petroleum gas alternate in isolated instances, and application as a source of synthetic natural gas for peak shaving. Estimates of investment and product cost based on existing technology indicate that methanol plants will be competitive with alternative energy sources.

49682 **APTIC NO. 72073**

Jensen, Donald D.

AIR CLEANING UNIT. *(Assignee not given.) U. S. Pat. 3,813,856. 5p., June 4, 1974. 6 refs. (Appl. Nov. 24, 1972, 6 claims).*

An air cleaning unit for removing fine particles entrained in air, especially grease particles resulting from cooking operations, is described that overcomes prior-art limitations of low efficiency, filter clogging, and corrosion. The unit s high efficiency in removing grease particles from an upward moving air stream is due to the fact that air currents are subjected to a centrifugal action prior to discharge from the unit. The current of air flowing through the unit is subdivided into a number of pairs of air streams, with component streams of each pair traveling at different velocities through the unit. By bringing the first and second air streams of each pair together prior to discharge from the unit, the entrained particles are subjected to a centrifugal force that flings them against the interior surfaces of the unit. The separated particles, in the presence of warm air currents, subsequently coalesce into liquid grease which flows to a suitable grease trap if the unit is angularly disposed to the air current.

49683 **APTIC NO. 69389**

Johnson, R. T.

ENERGY AND SYNTHETIC FUELS FOR TRANSPORTATION: A SUMMARY. *Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1974. 55 refs. (Presented at the Society of Automotive Engineers, West Coast Meeting, Anaheim, Calif., Aug. 12-16, 1974, Paper 740599.)*

Because of the fuel shortage, attention is being focused on possible substitute fuels for conventional gasolines and distillate-type fuels. The presently available synthetic or substitute fuels being considered for transportation uses are surveyed. Current energy use patterns in the transportation sector and projected future automobile and transportation modes are reviewed. Specialized fuels needs for the transportation sector are described including attributes of the ideal fuel. Possible synthetic fuels include hydrocarbons, hydrogen, inorganic hydrogen compounds, and electrochemical systems. The properties of an idealized synthetic fuel system are formulated and correlated with the properties of the ideal transportation fuel, and an extensive comparison of the selected synthetic fuel candidates is made. A significant portion of this comparative information is presented in graphical and tabular form with appropriate discussion of the data and its presentation. The application potentials of the various synthetic fuel candidates to various modes are described, including aviation and space, trains and other tracked vehicles, road-type vehicles, agricultural and construction vehicles, recreational vehicles, and small powerplants. Interim and long-term fuel possibilities are proposed for further consideration. (Author abstract modified)

49684 **APTIC NO. 71936**

Jonke, A. A., W. M. Swift, and G. J. Vogel

FLUIDIZED-BED COMBUSTION: DEVELOPMENT STATUS. *Preprint, American Inst. of Mechanical Engineers, Salt Lake City, Utah, Society of Mining Engineers, 34p., 1974. 10 refs. (Presented at the American Institute of Mechanical Engineers, Society of Mining Engineers, Fall Meeting, Acapulco, Mexico, Sept. 22-25, 1974, Paper 74-F-303.)*

The combustion of fossil fuels in a fluidized bed of calcined limestone particles is a potentially efficient and economically attractive process for the generation of steam for electric power production and other uses. The process results in greatly reduced emissions of both sulfur dioxide and nitrogen oxides. Development work, evaluations, and design studies are being carried out by various organizations. The principal reasons for developing fluidized bed combustion, its advantages and disadvantages over conventional combustion methods, and some of the potential applications of the process are discussed. The participants in the multi-organizational program, the sponsoring agencies, the general status of development of the overall project, and the chief program areas that still require resolution are discussed. The main features of a basic research and development program to evaluate the feasibility and potential of fluidized bed combustion at elevated pressures are discussed. Specific objectives of the study include: optimizing the combustion process with respect to sulfur dioxide retention in the fluidized bed of additive; nitrogen oxide suppression in the flue gas; combustion efficiency; determining the behavior of the system with a variety of coals including lignite and sub-bituminous coals; determining trace element pollutant levels in the flue gas; and elucidating mechanisms of reactions. (Author abstract modified)

49685 **APTIC NO. 71820**

Juentgen, Harald, Karl-Heinrich van Heek, and Juergen Klein

GASIFICATION OF COAL WITH HEAT FROM A NUCLEAR REACTOR. *(Vergasung von Kohle mit Kernreaktorwaerme). Text in German. Chem.-Ing.-Tech., 46(22):937-943, 1974. 18 refs.*

Coal can be converted completely into gas for heating purposes, reduction processes, and chemical syntheses by steam gasification. Conventional gasification processes employ the coal both as raw material for gas production and as a source of the necessary process heat. Recent proposals are based on the use of high-temperature nuclear reactors for the latter purpose. This would lead to a considerable saving of coal, thus lessening the burden on coal reserves and reducing the release of carbon dioxide. Studies on gasification kinetics and heat transfer led to the conception of an allothermic gas generator in which helium heat is transferred via an intermediate cycle from the reactor to a coal/steam fluid bed by means of a heat exchanger projecting into the fluid bed. About 50 tons/hr of coal can be gasified given a helium temperature of 950 C, a fluid bed volume of 318 cu m, and a heat transfer area of 4000 sq m. The current research and development program plans to run a demonstration plant by 1983/84.

49686 **APTIC NO. 72276**

Kanahira, Akitake

IDLING OPERATION APPARATUS FOR MULTICYLINDER FUEL INJECTION ENGINE. *(Takito nenryo funsha no aidoringu unten sochi). Text in Japanese. (Suzuki Automobile Industry Co. Ltd., Shizuoka (Japan)) Japan. Model Util. Sho 49-42490. 2p., Nov. 20, 1974. (Appl. Aug. 11, 1969).*

A device to cut off the fuel supply to a number of cylinders at idling is described for those engines equipped with multicylinder fuel injection systems. The discontinuation of the fuel gas supply to the cylinders is made by a magnetically operated valve which is related to the accelerator. When the engine is idling, a switch activates the magnetic valve and the tube leading to the cylinder closes while a valve on the tube leading to a dual tank opens, and the pumped gas returns to the tank. This valve is installed on several cylinders, but not on all. Thus, at idling only a certain number of cylinders are firing, which lowers the hydrocarbon levels in the exhaust gas since non-firing cylinders intake and discharge only air.

49687 **APTIC NO. 72257**

Kaneda, Yasuo

AUTOMATIC ROLLING TYPE ROLL AIR FILTER. *(Jido makitori shiki roru ea firuta). Text in Japanese. (Toyo Air Conditioning Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 49-45021. 3p., Dec. 9, 1974. 1 ref. (Appl. April 20, 1971).*

An apparatus equipped with a roll air filter is described. An unused roll of air filter is installed at one end of the apparatus and the used filter is accumulated at the other end. There is a window through which dust-containing air flows for filtration. A roller drives the unused filter into position, and a motor connected to the roller is automatically activated by the signal generated from an indicator whenever the filter surface accumulates too much dust. No rolling of used filter is necessary, and the used filter can be accommodated in a box which can be disposed of.

49688 **APTIC NO. 67869**

Kant, F. H., R. P. Cahn, A. R. Cunningham, M. H. Farmer, W. Herbst, and E. H. Manny

FEASIBILITY STUDY OF ALTERNATIVE FUELS FOR AUTOMOBILE TRANSPORTATION VOLUME II-TECHNICAL SECTION. *Exxon Research and Engineering Co., Linden, N. J., Office of Air and Waste Management Contract 68-01-2112, Rept. EPA-460/3-74-009-b, 236p., June 1974. 180 refs.*

NTIS: PB-235 582/AS

Feasible and practical alternatives to automobile fuels derived from petroleum for the 1975-2000 time period are identified. The alternative fuels are liquids derived from domestic coal and oil shale, specifically, gasolines, distillates, and methanol. Initial production of the fuels is likely within the next 5-7 yr. The altenrative fuels will begin to be used in conjunction with petroleum. Usage will expand as availability increases and the approach to complete replacement will be evolutionary. The individual fuels examined in detail differ in estimated cost but all may be producible at a cost level or range projected for petroleum fuels. Fuels were screened on the basis of economic, technical, and performance criteria, with consideration given to the way in which new fuel could be brought into general use. Consideration was given to the environmental impact of producing and using the fuels. Feasible and practical alternative automotive fuels were identified from a comprehensive list of initial possibilities. The shale derived fuels are projected to be cheaper than coal derived fuels over the entire timeframe of the study, but the quantitative development of shale oil will probably be limited environmentally and by other resources. The safety, toxicity, reliability, compatibility with different engines, and convenience of use were also considered. (Author summary modified)

49689 **APTIC NO. 69467**

Karim, G. A., M. Rashidi, and M. Taylor

AN ANALYTICAL STUDY OF THE COMPRESSION IGNITION CHARACTERISTICS OF H2-O2-N2 MIXTURES IN A RECIPROCATING ENGINE. *J. Mech. Eng. Sci., 16(2):88-94, 1974. 19 refs.*

Chemical kinetic data were used to model the combustion of hydrogen-oxygen-nitrogen mixtures in a reciprocating automobile engine in order to examine the effects of various operating variables on the production of nitrogen oxides from air-breathing, hydrogen fueled internal combustion engines. Although negligible amounts of NOx were formed during compression and prior to the period of rapid heat release, concentrations rapidly increased once ignition occurred. These NOx concentrations tended to remain around the values associated with the peak temperature and showed only very minor changes during expansion. Most of the NOx observed were in the form of nitric oxide. Concentrations of NOx for all cases involving compression ignition and homogeneous operation were reasonably well correlated logarithmically with peak cycle temperature. Oxygen addition for any constant equivalence ratio led to increased NOx production associated with this temperature effect. Nitrogen oxide production was not reduced to that achieved with air until an oxygen index value of around 0.90 was employed. Nitrogen addition to the air, however, was more effective in reducing NOx, primarily because of reduced peak temperatures.

49690 **APTIC NO. 71589**

Kearby, Kenneth Karl

PROCESS FOR REDUCING NITROGEN OXIDE CONTENT OF EXHAUST GAS. *(Esso Research and Engineering Co., Linden, N. J.) Brit. Pat. 1,362,466. 3p., Aug. 7, 1974. (Appl. May 16, 1972, 8 claims).*

A catalyst for the reduction of nitrogen oxides in internal combustion engine exhaust to nitrogen is described that overcomes prior-art disadvantages of materials deterioration associated with high surface area supports. The catalyst consists of a mixture of copper and nickel and is supported on a refractory support of low surface area (0.1-2.0 sq m/g). The support is chemically inert to the catalytic materials and may be composed of alpha alumina, zirconia, or inert silicas or silicates. The nickel-copper catalyst mixture contains at least 40 wt% nickel and at least 5 wt% copper.

49691 **APTIC NO. 72181**

King, Arthur S.

PARTICLE COLLECTOR. *(Assignee not given.) U. S. Pat. 3,828,526. 4p., Aug. 13, 1974. 14 refs. (Appl. Oct. 17, 1972, 4 claims).*

An electrostatic dust collector for treating airstreams of heating, cooling, and ventilating systems is described that functions in a corona-free manner to preclude the formation of ozone. The composite collector consists of inner and outer tubular electrodes separated by a dielectric casing. A charge is imparted to a dielectric sheathing around the outer electrode which attracts and retains the charged particulate matter. A series of composite collectors charged alternately positive and negative can be used to remove particulate matter of either charge. A spray wash system can be employed to periodically remove collected matter from the units. (Author abstract modified)

49692 **APTIC NO. 75287**

Kizim, I. A., L. A. Kiselman, I. K. Reshidov, and G. S. Chekanov

RESULTS OF RECONSTRUCTION OF PGD-3-38-PBTS ELECTROSTATIC PRECIPITATORS. *(Rezul taty rekonstruktsii elektrofil tra PGD-3-38-PBTs). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-8, Sept. 1974. 2 refs. Translated from Russian, 8p. (Also: Elektr. St. (Moscow), no 8:35-37, 1972.) (Entire report of TR 104-75 processed under APTIC 70040.)*

The reconstruction of an electrostatic precipitator serving a power plant producing about 45 g/cu m of fly ash in its flue gas discharge is outlined with respect to improvements in collection efficiency. The modifications performed were as follows: replacement of corrugated electrodes with C-shaped, broad-stripe types; the incorporation of an impact-hammer vibration system; repalcement of bayonet cross-section wire corona discharge electrodes with strip-needle electrodes (80 mm spacing); and the installation of an additional electrostatic precipitator field in place of a direct-flow cyclone battery. The cleaning efficiency was improved from 83.4-96.8% as a result of the precipitator modifications. Operation of the system proved stable over a 2-year observation period.

49693 **APTIC NO. 72265**

Knapp, Heinrich

FUEL INJECTION APPARATUS. *(Robert Bosch GmbH, Stuttgart (West Germany)) U. S. Pat. 3,828,749. 7p., Aug. 13, 1974. 3 refs. (Appl. July 5, 1972, 6 claims).*

An electronic fuel injection system that responds to internal combustion engine parameters in a manner such that a favorable fuel-air ratio is obtained for afterburning and thus purifying the exhaust is described. An air sensor deflected as a function of the intake air quantities maintains the air-fuel ratio at a constant value. The return force affecting the air sensor is derived from a pressurized liquid, with the pressure being altered in response to the oxygen content of the exhaust gas. An electrically energized solenoid forms a part of the pressure control valve.

49694 **APTIC NO. 72356**

Kobayakawa, Takashi, Hiromichi Kamiyama, and Mitsuharu Nakahara

AUTOMOBILE EXHAUST GAS CLEANING APPARATUS FOR INTERNAL COMBUSTION ENGINE. *(Jidosha yo nainen kikan no haiki gasu joka sochi). Text in Japanese. (Daihatsu Industrial Co., Ltd., Osaka (Japan)) Japan. Model Util. Sho 49-42489. 2p., Nov. 20, 1974. 1 ref. (Appl. July 31, 1969).*

An apparatus to decrease the nitrogen oxides emission from internal combustion engines at high speed operation is described. Water is injected into cylinders to lower the combustion temperature which decreases the formation of nitrogen oxides. The water is pumped from a tank. The electrical current to the motor is regulated by a variable resistor. Whenever the engine is operated at high speed, the resistance of the variable resistor is small, giving more current to the motor, thus a larger amount of water is pumped out. The variable resistor is mechanically related to the movement of the acceleration wire. The injection of water can be made from a carburetor or intake manifold pipe.

49695 **APTIC NO. 72274**

Koch, Christian

METHOD AND APPARATUS FOR OPERATING COMBUSTION ENGINES. *(Siemens Aktiengesellschaft, Berlin (West Germany)) U. S. Pat. 3,828,736. 6p., Aug. 13, 1974. 11 refs. (Appl. Jan. 18, 1972, 14 claims).*

A system employing catalytic oxidation and exhaust gas recirculation for the reduction of automotive exhaust emissions is described that allows for the use of gasoline fuels with a low octane number (about 40). The fuel, which contains no additive such as lead and is of low sulfur and aromatic content, is passed with an oxygen-containing gas over a catalyst for conversion into a gas mixture of methane and carbon monoxide at a temperature of about 300-500 C. The gas mixture is passed with additional oxygen-containing gas to the combustion engine for burning. Part of the exhaust gases produced in the combustion is fed back to the fuel, with the heat content of the exhaust gases being used to achieve the temperature necessary for catalytic conversion. The catalyst used in the converter may be a nickel, platinum, or nickel-platinum type and can be advantageously doped with uranium.

49696 **APTIC NO. 71810**

Koyama, Susumu

DRYING AND DEODORIZING APPARATUS FOR ANIMAL FECES AT ROOM TEMPERATURE. *(Kachiku fun joon kanso dasshu sochi). Text in Japanese. (Kawaguchi Shokosha, KK (Kawaguchi Commercial Industries, KK), Tokyo (Japan)) Japan. Pat. Sho 49-46816. 5p., Dec. 12, 1974. (Appl. Sept. 11, 1970, 1 claim).*

Pelletization, drying, and deodorization of fecal material are carried out in one installation. Pelletized fecal material (about 5 mm diameter) from domestic animals is carried along a mesh conveyor belt in a drying duct (consisting of two sections) constructed in an undulating shape for efficient air circulation. Feces is dried by blowing air (at about 35 C) through the duct. At the same time, malodors and water vapor are blown out into a deodorizing chamber for further treatment. Dried fecal pellets can be used for fertilizer, soil improvement, or be incinerated.

49697 **APTIC NO. 71649**

Kozhemyakin, V. A. and N. A. Vvedenskaya

WASTE WATER AND WASTE GAS PURIFICATION IN SEMICONDUCTOR MANUFACTURING PLANTS. *(Ob ochistke stochnykh vod i otkhodyashchikh gazov na predpriyatiyakh poluprovodnikovykh materialov). Text in Russian. Tsvetn. Metal., no. 9:47-50, Sept. 1974. 6 refs.*

Waste water and waste gas purification techniques in semiconductor manufacturing plants in the USSR are described. The technological waste gases containing hydrogen and silicon chlorides are sent to a scrubber in which they are purified with a soda solution at a flow rate of 5 m/sec and a spray density of 40 cu m/sq m/hr. The efficiency of the scrubbing process amounts to nearly 100%. The droplets are separated in a bubbler after which the purified gas is released into the atmosphere and hydrogen is burnt off. It is essential in this gas cleaning process that there be contact between the silicon chlorides and air to prevent explosions. Open-cycle gas cleaning by incineration in torches with subsequent separation of hydrochloric acid and silica is inadequate due to the sharply increased gas volume and to the low separation efficiency for hydrochloric acid and silica. Closed cycles makes it possible to reduce the gas volume to be treated, and to abandon preliminary incineration.

49698 **APTIC NO. 71667**

Kremer, H.

EMISSION OF POLLUTANTS FROM FURNACES AND REMEDIAL MEASURES. *(Ursachen der Entstehung und verbrennungstechnische Massnahmen zur Verminderung der Schadstoffemissionen von Feurerungen). Text in German. Gas Waerme Int., 23(11):444-450, Nov. 1974. 41 refs. (Presented at the Tagung Umweltschutz-Teknik und Recht. Kaiserlautern, West Germany, March 25-29, 1974.)*

The formation and emission of atmospheric pollutants from furnaces were investigated. The pollutants are emitted from the combustion products of different types of fuel and include soot, fly ash, sulfur trioxide, nitric oxide, nitrogen dioxide, carbon monoxide, and hydrocarbons. Emissions can be reduced below the values of conventional systems through burner design mdofications and combustion control techniques. Nitric oxide and NO2 can be reduced by changes on gas burners, but pulverized coal burners are a problem. There are various alternatives for small firing places.

49699 **APTIC NO. 72174**

Rubota, Atsu

DESULFURIZATION METHOD FOR EXHAUST GASES BY UTILIZING INDUSTRIAL WASTES. *(Sangyo haikibutsu o riyo suru haigasu datsuryu hoho). Text in Japanese. (Okawara Manufacturing Co., Ltd., Shizuoka Prefecture (Japan)) Japan. Pat. Sho 49-47149. 2p., Dec. 13, 1974. (Appl. Jan. 18, 1972, 1 claim).*

Industrial wastes are utilized in desulfurization of exhaust gases from heavy oil combustion. Industrial wastes, which need drying treatment, are mixed with calcium salt, and dried with heat contained in exhaust gases from heavy oil combustion. Calcium salt reacts with sulfur oxides in the exhaust gases to form gypsum, which is removed as solid matter. This recycling process is applicable to waste slurries from paper manufacturing plants and fibrous wastes from orange juice factories. Dried fibrous wastes retain water well, and can be used to improve soil.

49700 **APTIC NO. 72358**

Kuroda, T. and Y. Tatsutomi

THROTTLE VALVE CONTROLLING APPARATUS FOR CARBURETOR. *(Kikaki no surottoru barubu seigyo sochi). Text in Japanese. (Toyo Industrial Co., Ltd., Hiroshima (Japan)) Japan. Model Util. Sho 49-42491. 3p., Nov. 20, 1974. (Appl. Aug. 11, 1969).*

A device to increase idling speed for internal combustion engines equipped with automatic transmissions is described. An opening of the throttle valve of carburetors is increased when the transmission shift lever is in the driving position which activates the solenoid switch. The solenoid opens and closes a pipe which connects the intake pipe and a diaphragm. Whenever the connecting pipe is opened, the diaphragm increases the opening of the throttle valve mechanically. Thus the device compensates the decrease of throttle valve opening that generally occurs when the automatic transmission lever is shifted from the neutral position to the driving position. This reduces engine emissions at idling.

49701 **APTIC NO. 69195**

Kuroda, Yutaka

RECOMBUSTION TYPE EXHAUST GAS CLEANING APPARATUS. *(Saiuenshiki haiki joka sochi). Text in Japanese. (Nissan Automobile Co., Yokohama (Japan)) Japan. Pat. Sho 49-38766. 3p., Oct. 21, 1974. (Appl. May 13, 1970, 1 claim).*

An invention designed to clean internal combustion engine exhaust gases is described. By injecting secondary fuel or an air mixture into the cylinders, the temperature of exhaust gas is increased and toxic matter is burned without affecting the engine performance. Previously, recombustion of hydrocarbons and carbon monoxide were achieved by spark time delay and air jet, or by using excess fuel and secondary air. The former caused drastic power loss and the latter caused power loss and damages to the combustion chamber and lubricant. Here, the optimum air-fuel ratio is supplied by the carburetor or fuel injection valve, and the ignition is at the optimal time. When the exhaust valve begins to open the fuel-air mixture is injected into the high temperature cylinder. Part of the fuel begins to burn immediately with the remaining air in the cylinder and part is emitted into the exhaust as a high temperature combustible; here an effective recombustion is achieved. Therefore, the engine is operated at the optimum air-fuel ratio and optimum spark timing, and exhaust is cleaned without sacrificing engine performance.

49702 **APTIC NO. 72175**

Kusakawa, Hideaki and Kenzo Takahashi

NOXIOUS GAS REMOVAL AGENTS. *(Yugai gasu jokyozai). Text in Japanese. Mitsubishi Electric Appliances Co., Ltd., Tokyo (Japan)) Japan. Pat Sho 49-47156. 3p., Dec. 1974. (Appl. March 18, 1971, 1 claim).*

A new removal agent for acidic noxious gases and mists is described Half-dried, negative ion exhange resin (hydroxy type or carbonate type) is soaked for 24 hours or more in 20%-80% aqueous solution, containing one or more kinds of polyhydric alcohols, oxyalkylamines, or their derivatives. After removal from the bath, the moistened resin is ready for use, after leaving it at room temperature and allowing excess liquid to drain off. For safety and better exchange capability, a strongly basic negative ion exchange resin is preferred to a weakly basic one, although both can be used. Hygroscopic compounds, used in the resin soaking process, include the following: ethylene glycol and other dihydric alcohols; glycol derivatives; trihydric alcohols such as glycerin; glycerin derivatives; polyols of sugar derivatives (sucrose, sorbitol derivatives); alkyl Cellosolve; triethanolamine; diethanolamine; monoethanolamine; amine derivatives such as aminoethylethanolamine. Passing noxious gases through packed, treated ion-exchange resin resulted in one case of 100% removal of carbonic acid gas, and in another case, six months after treatment of the resin, of 55-65% removal of sulfur dioxide.

49703 **APTIC NO. 72259**

Kuwazawa, H. and J. Morikawa

AIR CLEANER. *(Kuki seijoki). Text in Japanese. (Mitsubishi Electric Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 49-45019. 2p., Dec. 9, 1974. (Appl. April 6, 1971).*

An air cleaning apparatus equipped with a heat exchanger for room heating or cooling is described. A single fan sucks in air and drives it through the filter and then the heat exchanger. The heat exchanger can be used for either heating or cooling. Since the apparatus achieves both cleaning and heating or cooling air, the space required for the installation is small.

49704 **APTIC NO. 71847**

Lang, Robert Joseph

REACTOR ASSEMBLY TO REDUCE AUTOMOTIVE EMISSIONS FROM AN INTERNAL COMBUSTION ENGINE. *(Esso Research and Engineering Co., Linden, N. J.) Brit. Pat. 1,360,433. 9p., July 17, 1974. (Appl. July 21, 1971, 11 claims).*

An exhaust reactor for the thermal oxidation of hydrocarbons and carbon monoxide emitted from internal combustion engines is described. The reactor consists of a pair of oppositely facing circular end walls which define with a peripheral wall a reaction chamber. The reaction chamber includes an exhaust outlet aperture, and exhaust outlet conduit, and an inner wall dividing the reaction chamber into an annular outer chamber and an inner chamber. The inner chamber communicates directly with the exhaust outlet aperture. Exhaust gas is circulated around the interior of the annular outer chamber and parallel to a peripheral wall. The inner wall has an aperture for the passage of exhaust gas from the outer chamber to the inner chamber such that some of the exhaust gas in the outer chamber circulates past the aperture in the inner wall and mixes with exhaust gas entering the outer chamber through the exhaust gas inlet. The flameholder is provided in the exhaust inlet conduit or at the upstream end thereof. Means may also be provided for recycling a portion of the exhaust gas from the exhaust outlet conduit of the reactor to the engine intake for the reduction of nitrogen oxide emissions.

49705 **APTIC NO. 71719**

Lawson, Alexander

EMISSION CONTROL SYSTEM. *(Ontario Research Foundation, Sheridan Park (Ontario)) U. S. Pat. 3,826,810. 6p., July 30, 1974. 8 refs. (Appl. May 8, 1972, 24 claims).*

A catalytic process for reducing nitrogen oxides in internal combustion engine exhaust to nitrogen is described that overcomes prior-art disadvantages relating to temperature-induced deterioration of the catalyst and cold-start problems. The gas stream in the presence of moisture and oxygen is contacted with solid urea at a temperature of less than 200 C for the catalytic conversion of NOx to N2. The addition of moisture to the oxygen- containing gas stream as well as the nature of the catalyst employed permit the chemical reduction to occur at temperatures substantially below those encountered in prior-art designs.

49706 **APTIC NO. 71970**

Leith, William C.

ROTATING CONCENTRIC HOMOGENEOUS TURBULENCE GAS SCRUBBER. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974. EPA-650/2-74-112, p. 82-90. 6 refs. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

A rotating concentric homogeneous turbulence gas scrubber for fine particulate removal is described. Couette (secondary) flow patterns, which are developed in a fluid between rotating concentric cylinders, is used to impose an adjustable residence time for uniform mixing prior to separation by wetting, absorption, solution, agglomeration, and settling of the particulates in the annulus of the scrubber liquid. Predicted collection efficiency for the rotating concentric homogeneous turbulence gas scrubber can be calculated using Brownian movement where the increased residence time accentuates the increase of Brownian displacement with smaller particle size. The device is presently untested.

49707 **APTIC NO. 75288**

Levetov, V. I., I. K. Reshidov, and I. A. Kizim

INFLUENCE OF TECHNOLOGICAL PARAMETERS OF GAS ON ELECTROSTATIC PRECIPITATOR EFFICIENCY. *(Vliyaniye tekhnologicheskikh parametrov gazov na effektivnost elektrofiltrov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-12, Sept. 1974. 3 refs. Translated from Russian. 12p (Also: Elektrichestvo, no. 5:71-74, 1974.) (Entire report of TR 104-75 processed under APTIC 70040.)*

Laboratory and field investigations were conducted to determine methods for increasing the fly ash collection efficiency of electrostatic precipitators serving power plants. Intense reverse corona and nonuniform current distribution over the precipitating electrode surfaces were identified as the major factors limiting collection efficiency. The following modifications to a power plant precipitator resulted in increased collection efficiencies from 87.5% to 96.8%: replacement of the bar cross section corona discharge electrodes with needle electrodes (80 mm spacing); replacement of corrugated precipitating electrodes with C-shaped, wide-strip electrodes; installation of an additional electrostatic precipitator field; and the utilization of stronger precipitating electrode vibration. Field experiments with precipitators handling high-resistivity fly ash revealed that the addition of ammonia (8-32 ppm by volume) to the flue gases ahead of the precipitator increased the collection efficiency from 88.4-98.3%.

49708 **APTIC NO. 71597**

Linger, I. N. and S. I. Korneyev

IMPROVING THE EFFICIENCY OF DUST SEPARATORS. *(Uluchsheniye raboty pyleulavlivayushchikh apparatov). Text in Russian. Tsement, no. 12:11-12, 1974.*

Design modifications of an electrostatic precipitator installed at a cement mill are described. The uneven gas velocity distribution, and the resulting low dust separation efficiency of 98.4%, accounting for a residual dust concentration of 0.22 g/cu m, made it necessary to replace the inefficient distribution grids by guide blades in the horizontal space of the inlet duct, and by distribution plates in the vertical space, as well as inside the separator chamber. As a result, the efficiency of the electrostatic precipitator increased to 98.8-99.2%, and the residual dust concentration fell to 0.12-0.17 g/cu m.

49709 **APTIC NO. 71982**

Lucas, G. G.

THE AUTOMOTIVE INDUSTRY. *Loughborough Univ. of Technology (England), Leverhulme Project, Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-12. (Jan. 7-8.)*

The control of automobile emissions of carbon monoxide, hydrocarbons, nitrogen oxides, particulates, and lead primarily by methods other than retrofitting is examined within the context of recent legislation concerning exhaust emissions. Various engine modifications involving engine size, compress ratio, stroke/bore ratio, valve timing, and combustion chamber design are reviewed along with operating modifications dealing with engine speed, air/fuel ratio, and spark timing. Research into weak-mixture running and flame speed control is also reviewed. The rotary piston and stratified charge engines are examined as alternatives to the conventional piston engine. The advantages of such concepts in terms of maintaining thermal efficiency and lowering pollution are assessed in relation to the deleterious effects of hang-on devices on engine operation and fuel economy. European legislation on motor vehicle emissions is compared to American legislation, with particular emphasis on future legislation in the state of California.

49710 **APTIC NO. 72260**

Maeda, R.

CYCLONE-SCRUBBER. *(Saikuron sukuraber). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 49-45026. 2p., Dec. 9, 1974. (Appl. April 9, 1971).*

A cyclone-scrubber utilizing sprayed water mist is described for dust removal from air. A cylindrical apparatus has a rotating fan to disperse water. The dispersed water droplets collide with atomizing plates above the fan and the fine water mist flies upward along the wall of the apparatus and falls back through the middle of the apparatus, thus generating a circulating motion in the water mist, which improves the mixing efficiency between air and water mist. The falling mist hits the fan and again flies upward. The apparatus is simple, inexpensive and efficient.

49711 **APTIC NO. 71791**

Marosi, Mihaly

PROBLEMS OF ENVIRONMENTAL PROTECTION AT ALUMINA PLANTS. *(A timfoldgyartas kornyezetvedelmi osszefuggesei). Text in Hungarian. Tatabanyai Szenbanyak Muszaki-Kozgazdasagi Kozl., 14(2-3): 115-118, April-Sept. 1974.*

Thye problems of air, water, and noise pollution at the Almasfuzito Alumina Plant in Hungary are described. The bauxite storage facilities and the red mud dumps, when dry, constitute a major source of particulate emissions. Attempts are being made to abate dust emissions from red mud dumps in an inexpensive, efficient manner. An exhaust system and bag filters are provided for dust separation in bauxite handling operations. The dust generated by the calcination plant is separated by electrostatic precipitators. The residual dust concentration is well below 150 mg/N cu m. The sulfur dioxide emission shows a decreasing trend due to the reduction of the specific thermal energy requirement for alumina production, and to the switchover to oil firing.

49712 **APTIC NO. 71872**

Masterovoy, E. I., V. I. Zabramnyy, and A. Y. Orlov

DETOXIFICATION OF CYANIDE-CONTAINING WASTE FROM GAS CLEANING INSTALLATIONS IN FERROCHROMIUM PRODUCTION. *(Obezvrezhivaniye tsianidsoderznashchikh stochnykh vod i shlamov v oborotnoy sisteme vodosnabzheniya gazoochistok proizvodstva ferrokhroma). Text in Russian. Stal, no. 4:378-380, 1974.*

Methods for waste gas cleaning in the ferrochromium industry, and for the detoxification of cyanide-containing waste water and sludge from the gas cleaning installations are described. The flue gas from closed electric-arc furnaces contains chromium trioxide, magnesia, silica, alumina, ferric oxide, calcia, and phosphorus pentoxide, as well as such gases as carbon monoxide (81%), carbon dioxide (6.8%), hydrogen (8.7%), methane (0.2%), and hydrocyanic acid plus hydrogen sulfide (0.9%). The flue gases are led through a sloped gas duct where most of the 0.5-2 micron dust fraction settles, after which the gases are cleaned in successive venturi scrubbers and the water droplets are separated. The waste water and sludge from the gas cleaning installations contain high amounts of toxid cyanides. The cyanide-containing sludge is detoxified by incineration in a furnace at temperatures over 650 C to decompose the cyanides into carbon dioxide, nitrogen, and water.

49713 **APTIC NO. 71826**

Masuda, Nobuo

LOW NOX BURNER OF DAIDO STEEL CO. *(Daido seiko no tei NOx bana). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(12):25-31, Dec. 1974.*

Three types of Daido-Caloric burner (R1, RO1 and RO2) are described. The R1 burner features a contraction area at the exit of the combustion chamber so that combustion occurs at high temperature without heat release. RO1 and RO2 are improved types of R1 with no contraction area and combustion occurs at reduced temperature due to efficient heat release from the combustion chamber. The RO2 burner circulates part of its combustion gas, thus further reducing the combustion temperature and nitrogen oxides. Test results showed that RO2 significantly reduced NOx compared to conventional burners. The burners are applicable to boilers, industrial furnaces, and gas generators.

49714 **APTIC NO. 71825**

Matsuo, M.

LOW NOX BURNER OF NIHON FURNACE INDUSTRIAL CO. *(Nihon fanasu kogyo no tei NOx bana). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(12):53-61, Dec. 1974.*

Two burners, NFK-TRW for boilers and NFK-SRG for petroleum heating furnaces, are described. In a NFK-TRW burner, fuel is supplied through a cylindrical path and mixed with air around a diffractor to form a thin film. The surface area of the resulting thin flame is large so that heat diffusion is fast. An NFK-SRG burner utilizes high-speed fuel spray which results in countercurrent air suction. The combustion gas resulting from partial combustion again mixes with the incoming fuel vapor and gasification of the fuel occurs while the temperature of the combustion gas is reduced. Test results of the TRW burner for a 4 million kcal/hr boiler using a heavy oil containing 0.03% nitrogen showed about 40% nitrogen oxides reduction, compared to that of a conventional NFK burner. The SRG burner also showed remarkable NOx control effect.

49715 **APTIC NO. 72190**

Matsuo, Masaharu

METHOD OF TREATMENT FOR EXHAUST GASES FORMED BY CALCINATION OF POWDER FORMED BY AMMONIA TREATMENT OF EXHAUST GASES FROM HEAVY OIL COMBUSTION. *(Juyu nensho haigasu no anmonia shori ni yori seisei shita funtai no shosei haigasu no shori hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 49-47148. 3p., Dec. 13, 1974. (Appl. Jan. 10, 1972, 1 claim).*

A method is described for the ultimate recovery of ammonia, after its use in treatment of exhaust gases from heavy oil combustion. Ammonia gas is blown into exhaust gases from heavy oil combustion, to form fine powders (specific gravity, about 0.1). To reduce the bulk of these powders and permit ease of handling, calcination is effected at 700-750 C. Exhaust gases from calcination are sprayed in a wash tower with an aqueous solution of one or more basic inorganic compounds (hydroxides, carbonates, silicates of sodium and potassium; hydroxides and oxides of magnesium and calcium; hydroxides of barium and aluminum). Gases are cooled to about 90 C by the washing process; water vapor and sulfuric acid components are separated and absorbed. The wash solution is recirculated, after non-poisonous waste products are removed by precipitation. The remainder of the gases are sent under pressure through a rectification tower, where ammonia gas is separated from other gases and recovered. Purified ammonia gas is sent under pressure to a liquid ammonia tank, or in gaseous form to ammonia gas accumulator, for reuse. Nitrogen gas, and other gases separated from ammonia, are exhausted into the atmosphere.

49716 **APTIC NO. 75107**

McCain, Joseph D.

EVALUATION OF AERONETICS TWO-PHASE JET SCRUBBER. *Southern Research Inst., Birmingham, Ala., Environmental Protection Agency Contract 68-02-1480, Program Element 1AB012, ROAP 21ADL-004, Rept. EPA-650/2-74-129, SORI-EAS-75-022, 42p., Dec. 1974.*

NTIS: PB 239422/AS

Field tests were conducted on an Aronetics two-phase jet scrubber used for controlling particulate emissions from a ferroalloy electric arc furnace. The collection efficiency of the scrubber was 95.1 and 96.7% for 2 days of testing. Measured fractional efficiencies were about 70% at 0.01 micron particle diameter, 35% at 0.05 micron, 35% at 0.1 micron, 99% at 0.5 micron, 99% at 1 micron, and 99.4% at 5 micron. Scrubber energy usage during the tests was approximately 17,000 BTU/SCF at a net pressure rise of 12.5-16 in. water. Since this energy usage was a result of using all of the process waste heat available, it may have been in excess of the minimum amount required to achieve the efficiencies obtained during the tests. (Author conclusions modified)

49717 **APTIC NO. 71951**

McCarthy, D., A. J. Yankel, R. G. Patterson, and M. L. Jackson

MULTISTAGE FLUIDIZED BED COLLECTION OF AEROSOLS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. 43 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 1974, Paper 74-AP-24.)*

The collection of dioctyl phthalate (liquid) aerosols by 1-inch deep fixed and fluidized beds (2.5 cm) of 135 micron diameter alumina granules was observed in a multistage arrangement of a 6-inch diamter column. Collection efficiencies were determined for each bed in a multistage column and overall for up to five stages. The collection efficiencies exceeded 99.9% for each of several aerosol sizes in a single fixed bed when the gas velocity was just below that for minimum fluidization. The efficiencies decreased markedly upon fluidization and with increasing gas velocity. Efficiencies of 70, 55, 42, 57, 58, 67, and 81% were obtained at flows of 2.5 times the minimum fluidization velocity ofr particle sizes of 1.4, 1.0, 0.67, 0.37, 0.28, 0.13, and 0.06 micron, respectively. The predominant collection mechanism for aerosols above about 0.7 micron was interception which decreased with decreasing particle diameter. The predominant mechanism for aerosol sizes below about 0.4 micron was Brownian diffusion which increased with decreasing particle size. The overall percentage efficiency of a multistage unit equalled 100(1 - p to the n power) for n stages, where p is the penetration per stage. Pressure losses were 0.8 in. water for each 1-inch deep bed. (Author abstract modified)

49718 **APTIC NO. 71717**

McCormick, Walter R.

METHOD FOR SCRUBBING HCL FROM WASTE GASES. *(N L Industries, Inc., New York) U. S. Pat. 3,826,816. 4p., July 30, 1974. 4 refs. (Appl. Sept. 13, 1972, 10 claims).*

A cyclic scrubbing process for removing hydrogen chloride from exhaust gases of spray dryers used for dehydrating hydrous magnesium chloride is described that allows for the recovery of substantially greater concentrations of calcium chloride than prior-art processes. The process consists of contacting the waste gases with a scrubbing medium of calcium hydroxide and relatively high calcium chloride brine concentrate to convert the hydrogen chloride to calcium chloride brine of relatively low concentration. The scrubbing medium is maintained at a pH of between 3-7 to insure efficient conversion of the hydrogen chloride to calcium chloride and to inhibit the formation of insoluble calcium carbonate. The scrubbing medium is continuously recycled to convert newly formed calcium chloride brine of relatively low concentration to a brine of relatively high concentration. Simultaneously, a portion of the highly concentrated calcium chloride brine is recovered for industrial purposes.

49719 **APTIC NO. 67998**

McLean, Arthur F.

LOW EMISSIONS CATALYTIC COMBUSTION SYSTEM. *(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,797,231. 7p., March 19, 1974. 6 refs. (Appl. July 31, 1972, 9 claims).*

A low emissions caralytic combustion gas turbine engine is described which reduces nitrogen oxide emissions to levels below 2 ppm and achieves a more even temperature gradient across the hot gases generated by catalysis for driving a turbine wheel. The invention provides for adding primary heat to a continuous combustion process using a catalytic combustion mechanism effective in promoting sustained combustion with lean or exceptionally lean air/fuel mixtures. A supply of compressed air is divided so that a portion can be mixed with fuel to support a local flame on the surface of a heat exchanger through which all portions of the flow pass to be combusted. The flame brings the temperature of the flow up to a predetermined operating range for supporting catalytic combustion, at which time the local flame is extinguished. (Author abstract modified)

49720 **APTIC NO. 72224**

Misawa, Kiyosuke

DUST COLLECTION METHOD IN TUNNELS BY PLATE ELECTRODES. *(Denkyokuban o mochiita tonneru nai no shujin hoho). Text in Japanese. (Japan National Railroad Service) Japan. Pat. Sho 49-46831. 2p., Dec. 12, 1974. (Appl. Nov. 26, 1970, 1 claim).*

An electrostatic dust collection method for tunnels is described. Plate electrodes of uniform shape and size, made of conductive material, are attached to concrete walls of tunnels by means of rigid supports. These plates are for electrostatic dust collection. On the other hand, static electricity discharge electrodes, attached to cables, are suspended at appropriate positions in the tunnel. By passing electricity through these discharge electrodes, carbon and dust particles are made to adhere to the electrostatic dust collector plate electrodes instead of the concrete walls.

49721 **APTIC NO. 72120**

Mitani, Mitsuo

SEMI-CONTINUOUS DEODORIZATION DEVICE FOR COOKING OIL WITHOUT ORGANIC HEATING CATALYSTS. *(Yuki netsu baitai o tsukawanai shokuyoyu no hanrenzoku dasshu sochi). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 19(9):48-53, Sept. 1974.*

The deodorizing device described consists of two major parts, a deodorizing tank with 6 consecutive trays and a boiler which supplies heating medium. Raw cooking oils are supplied through a measuring tank to the first tray on top of the deodorizing tank. The oils are preheated at 150 deg by saturated steam on the first tray and are transferred to the tray below where they are heated at 250 deg by heating medium supplied from the boiler. The oils are again transferred to the third tray below which steam is supplied for steam distillation. Further distillation is employed on the 4th tray to which heating medium is again supplied. After the last distillation on the 5th tray, the oils are cooled on the 6th tray and discharged from the bottom of the tank. A boiler with a heat output of 100,000 kcal/hr is capable of treating 1000 to 1200 kg/hr of oil.

49722 **APTIC NO. 72228**

Moramatsu, M., K. Iwamoto, K. Honma, T. Osaka and M. Araki

INFLUENCE OF ATMOSPHERIC SO2 AND NOX ON INDOOR AIR. *(Taikichu no SO2, NOx no shitsunai eikyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):589, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 438.)*

The effectiveness of different air filter installations used in three buildings in Tokyo toward removal of sulfur dioxide and nitrogen oxides was investigated. Air filter equipment included activated carbon, chemical and metal (such as copper wool) filters, Autoroll filter, bag filter, and electrostatic precipitator. Interior concentrations (0.2-0.04 ppm) of SOx and nitrogen dioxide were about half of their exterior concentrations, but interior nitric oxide concentrations (0.04-0.10 ppm) were higher, indicating NO sources (such as smoking) within the buildings.

49723 **APTIC NO. 71694**

Moriguchi, M., H. Abe, Y. Saito, and M. Miyazawa

REMOVAL METHOD OF NITROGEN OXIDES IN EXHAUST GAS. *(Haigasu chu no chisso sankabutsu no jokkyo hoho). Text in Japanese. (Nihon Kokan Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho-49-49289. 7p., Dec. 26, 1974. (Appl. Sept. 12, 1972, 1 claim).*

A new method for the removal of nitrogen oxides from waste gases features the use of at least one of the following sulfites or bisulfites: sulfites and bisulfites of ammonium, alkali metals, and alkali earth metals with bivalent cupric ion alone or with bivalent cupric ion and bivalent manganese ion. Gas from a sintering plant was introduced at 200 ml/min to an absorption apparatus containing 500 ml of absorbent, which was prepared by adjusting the pH of a 15% $(NH_4)_2SO_3$ and 15% NH_4HSO_3 solution to 6.2 with sulfur dioxide followed by the addition of 0.01% by weight of Cu(II) and Mn(II). At 50 deg, nitric oxide and nitrogen dioxide were reduced from 180 ppm to 40 ppm, a 78% removal rate.

49724 **APTIC NO. 69749**

Muramatsu, Manabu, Kumejiro Iwamoto, Yukio Kakizaki, Keiichi Honma, Shoichi Fujii, Shu Minamino, Susumu Yoshizawa, Yoshima Kenemitsu, and Joichi Kimura

FIELD INVESTIGATION OF AIR REGULATING FILTERS IN BUILDINGS. *(Biru no kuki choseiyo firuta no genba ni okeru chosa kenkyu). Text in Japanese. Preprint, Japanese Society of Public Health, Fukushima, p. 401, 1974. 1 ref. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 531.)*

The effectiveness of various types of air purification equipment was examined in a field study. Three buildings in metropolitan Tokyo with differing purification installations, were selected. Indoor and outdoor concentrations of sulfur dioxide, nitrogen oxides, carbon monoxide, and airborne particulates were measured, and the degree of removal of these pollutants was determined. Building A, with the usual Autoroll type dust eliminator showed the air purification. Building B (with an electrostatic precipitator, chemical filter, and activated charcoal filter) and Building C (with two sets of activated charcoal filters) gave better results. More than 80% of the dust was removed in these two buildings. In Building B, 47% of the nitrogen dioxide was removed; the Building C, 44% of the SO_2 was removed. Inconclusive results were obtained for all three buildings for removal of nitric oxide and CO.

49725 **APTIC NO. 72027**

Nagata, Katsunari

COUNTERMEASUREMENTS OF NOX REDUCTION IN COMBUSTION TECHNIQUE. *(Nensho gijutsu ni yoru NOx teigen taisaku). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(12): 10-20, Dec. 1974. 14 refs.*

A general discussion is given on the development of nitrogen oxides countermeasures focusing on low NOx burners. Nitrogen oxides are formed through two routes, high temperature oxidation of nitrogen in air and combustion of nitrogen compounds in fuel. Petroleum fuels and coal contain nitrogen compounds such as pyridine, quinoline, indole, carbazole, etc. A heavy oil contains up to 0.08 wt% N, B and C heavy oils up to 0.35 wt%, and coal up to 2.5 wt%. Low NOx burners can be divided into 4 major categories, namely, mix-promotion type, flame partition type, self-recycling type and multi-stage combustion type. The mix-promotion type burner has the advantages of stable flame diameter and length, and greater air-pressure drop. The flame partition type features low combustion temperature and short staying time. The self-recycling type is usable for heavy oil and gas fuel, and large scale reduction of fuel NOx is possible. The multi-stage burner features low oxygen combustion for NOx reduction.

49726 **APTIC NO. 71680**

Nakai, Yoshiyuki and Tetsuya Yokokawa

METHOD AND APPARATUS FOR DEODORIZATION OF GAS CONTAINING ODOR AND WATER VAPOR. *(Suibun akushu seibun o fukunu gasu no mushuka hoho oyobi musuka sochi). Text in Japanese. (Kanagawa Prefectural Government, Kanagawa (Japan)) Japan. Pat. Sho 49-47506. 4p., Dec. 16, 1974. (Appl. May 26, 1969, 2 claims).*

A new process for the deodorization of waste gas from fertilizer and animal feed manufacturing processes consists of mixing the waste gas with air followed by oxidation-decomposition by combustion. Waste gas in the heating chamber of the dryer is mixed with fresh air from a gas inlet and the mixture is introduced to the combustion chamber through a gas duct with the aid of a blower. The combustion chamber, consisting of two connected chambers, has a heat-resisting housing of aluminum alloy. Heavy oil is supplied through a spray nozzle between the two chambers where the mixed gas is again mixed with oil mist. The mixture is then ignited by a filament. The combustion gas moves along a tapered surface to a straight surface where it is again mixed with air and the oxidation-decomposition is complete at a temperature up to 2000 deg.

49727 **APTIC NO. 71703**

Nakajima, Yasuo, Takeji Oguri, and Hiroshi Kwioda

AIR-POLLUTION PREVENTIVE ARRANGEMENT. *(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,826,089. 16p., July 30, 1974. 8 refs. (Appl. July 7, 1971, 5 claims).*

A combination thermal reactor-catalytic converter arrangement for reducing hydrocarbon and carbon monoxide emissions from internal combustion engines is described that allows for the efficient oxidation of these exhaust substances in the absence of extremely high temperatures. The thermal reactor is used for the primary recombustion of exhaust gases, while the catalytic converter performs secondary recombustion. An air injection unit supplies additional air which is mixed in limited proportion with the exhaust gases entering the thermal reactor to aid in the primary recombustion. Additional air may also be mixed with the exhaust gases entering the catalytic converter located downstream of the reactor.

49728 **APTIC NO. 72160**

Nakamura, Harutoki and Jun Yagi

PROCESS FOR PREPARING CATALYST FOR EXHAUST GAS PURIFICATION. *(Matsushita Electric Industrial Co., Ltd., Osaka (Japan)) Brit. Pat. 1,365,916. 8p., Sept. 4, 1974. (Appl. July 27, 1971, 10 claims).*

A method for preparing an oxidation catalyst used for reducing the amount of carbon monoxide and hydrocarbons in automobile exhaust gas is described. A glass fiber fabric is treated with an acid to increase the proportion of silicon oxide in the glass fibers prior to the deposition of a catalyst layer. In the preferred form of the invention, at least one organic chromium, cobalt, copper or nickel compound is deposited on the fabric before the catalyst is deposited thereon. The catalyst layer contains a cobalt oxide, a copper oxide, and metallic platinum. At least one oxide of chromium, aluminum nickel, or manganese is used as a promoter.

49729 **APTIC NO. 71830**

Nakano, K.

COMBUSTION FURNACE. *(Shokyakuro). Text in Japanese. (Iwasaki Chemical Industrial Co., Ltd., Otshushi (Japan)) Japan. Model Util. Sho 49-44305. 3p., Dec. 4, 1974. (Appl. June 12, 1970).*

A furnace for complete combustion of organic materials of high viscosity, such as tar and pitch, is described. The combustion furnace has double layered jackets; the inner jacket for cooling water and the outer for air. Several mixing fans are employed on the bottom of the furnace and air is supplied from the bottom and side walls of the furnace to improve the combustion. The amount of air entering into the furnace is regulated by a means of a photodiode which detects the intensity of a light installed inside the furnace. Whenever an incomplete combustion occurs, the light intensity reaching the photodiode is weakened due to the smoke produced and the photodiode activates an air supplying motor to increase the air for combustion.

49730 **APTIC NO. 72301**

Nambu, Shyuya

AUTOMOTIVE AIR-FUEL MIXTURE HEATING SYSTEM. *(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,828,747. 10p., Aug. 13, 1974. 11 refs. (Appl. Dec. 14, 1972, 27 claims).*

A heating system that produces improved vaporization of the air-fuel mixture of an internal combustion engine during warm-up periods and thus less exhaust pollution is described. A combustion chamber is positioned in contact with the interior of a mixture supply passage and thereby heats the mixture in the passage when the engine is cold. The heating effect also produces a more even distribution of the mixture to individual engine cylinders. The hot exhaust gases produced in the combustion chamber may be recirculated into the mixture supply passage to contribute to the further heating of the fuel-air mixture.

49731 **APTIC NO. 71906**

Nelson, P. A., A. A. Chilenskas, and R. K. Steunenberg

THE NEED FOR DEVELOPMENT OF HIGH-ENERGY BATTERIES FOR ELECTRIC AUTOMOBILES. *Argonne National Lab., Ill., Chemical Engineering Div., Nonnuclear Energy Sources and Energy Conversion Devices Rept. UC-13, 24p., Nov. 1974. 32 refs.*

NTIS: ANL-8075

The environmental impact and requirements of high-energy batteries for electric automobiles are discussed. Electric cars would reduce the demand for oil, provide more efficient utilization of energy resources, and reduce air pollution. Equivalent ground level emissions were estimated for gasoline powered motor vehicles and electric powered motor vehicles for 1980 for total particulates, respirable particulates, benzo(a)pyrene particulates, sulfur dioxide, nitrogen oxides, carbon monoxide, and hydrocarbons. A battery with a specific energy of 150 W-hr/kg and a peak specific power of 200 W/kg seems feasible. A battery with these characteristics weighing 230 kg and storing 35 kW/hr would power a 1275-kilogram car at speeds and acceleration rates commensurate with gasoline cars and would provide a range of 100 mi. (Author summary modified)

49732 **APTIC NO. 71575**

Newson, Esmond John

PROCESS FOR THE HYDRODESULPHURISATION OF HEAVY HYDROCARBON OILS. *(Haldor Frederik Axel Topsoe) Brit. Pat. 1,364,238. 11p., Aug. 21, 1974. (Appl. Aug. 4, 1970, 14 claims).*

A process for the hydrodesulfurization of residual and crude oils is described that provides for improved catalyst stability and reduced pressure drop as compared to conventional fixed bed processes with axial flow. A gaseous hydrogen phase and a liquid heavy hydrocarbon oil (0.05:1 minimum ratio) are passed continuously through a catalyst bed between vertical concentric cylindrical walls containing passages. The hydrogen and/or heavy hydrocarbon oil are introduced into the catalyst bed through an outer vertical wall of the catalyst bed, with all of the gaseous phase leaving the catalyst bed and passing through the inner vertical wall.

49733 **APTIC NO. 71651**

Neyelov, I. P., V. I. Filipov, G. F. Ganzha, and Y. G. Shulika

STUDY OF METHODS FOR THE CAPTURE OF NITROGEN OXIDES IN LOW CONCENTRATIONS. *(Issledovaniye metodov ulavlivaniya okislov azota nizkikh kontsentratsiy). Text in Russian. Khim. Tekhnol., no. 5:32-34, 1974. 6 refs.*

Different mechanical absorption methods for the capture of nitric oxide and nitrogen dioxide mixtures at concentrations below 0.1% were studied. For gaseous mixtures in which NO was oxidized to NO2 at a reat of over 50%, the rate of absorption in a bubbler type absorber using a calcium hydroxide solution increased from 23 to 48% as the nitrogen oxides concentration increased from 0.01 to 0.1% at 20-30 C. A venturi scrubber with a gas flow rate of 50-100 m/sec had very low efficiency for nitrogen oxides due to the short contact time. The rate of absorption increased in proportion to the increase in the nitrogen oxides concentration, but was practically independent of the gas flow rate between 0.05 and 0.1 m/sec in absorbers with sprayed walls. Fluidized-bed adsorbers with 0.5-1 mm lime granules had efficiencies of 50% at 0.2 g/cu m, and 80% at 2 g/cu m, but the efficiency dropped from 80% to 43% as the bulk speed was increased from 6000 to 45,000/hr.

49734 **APTIC NO. 72180**

Nishiguchi, Kouichi

SYSTEM FOR REDUCING TOXIC COMPOUNDS IN EXHAUST GASES FROM INTERNAL COMBUSTION ENGINES. *(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,828,552. 6p., Aug. 13, 1974. 3 refs. (Appl. Nov. 8, 1972, 5 claims).*

A system for minimizing the concentration of nitrogen oxides in internal combustion engine exhaust gases while simultaneously reducing the concentration of hydrocarbons and carbon monoxide is described that accomplishes the above in a relatively simple manner. The system incorporates an air denitrogenating unit that separates nitrogen molecules from atmospheric air. The nitrogen molecules are then introduced into an air induction passage of the engine to enrich the air-fuel mixture, resulting in a reduction of nitrogen oxides in the exhaust. The denitrogenated air containing a large proportion of oxygen is supplied into the exhaust manifold of the engine as secondary air for the oxidation of unburned hydrocarbons and carbon monoxide in the exhaust.

49735 **APTIC NO. 71757**

Nishimura, Toshibumi, Hiroaki Miyazaki, and Masaaki Saito

SPARK IGNITION IN SUPPORTING CHAMBER FOR INTERNAL COMBUSTION ENGINE. *(Fukushitsu shiki hibana tenka nainen kikan). Text in Japanese. (Nissan Automobile Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 49-46322. 2p., Dec. 18, 1974. (Appl. Dec. 7, 1971).*

A device for spark ignition in the supporting chamber of internal combustion engines is described. A screening plate is employed in front of the channel between the supporting and main combustion chambers, and the spark plug is protected by this screening plate. Therefore, when the main chamber is compressed by the piston, the gas in the main chamber cannot flow through the spark plug in the supporting chamber, thus preventing misfire. Since the spark plug can be installed near the main chamber, the combustion sound can also be reduced.

49736 **APTIC NO. 71824**

Nozawa, Masaaki

LOW NOX BURNER OF TOKYO GAS CO. *(Tokyo gasu no tei NOx bana). Text in Japanese. Netsu Kanri To Kogai (Heat Management Public Nuisance). 26(12):67-70, Dec. 1974.*

A high efficiency anti-air pollution combustion (APOC) burner featuring two-stage combustion was developed. A 0.5-0.7 air to fuel gas ratio was used for the first stage combustion and the partial combustion gas consisting mainly of hydrogen and carbon monoxide was then completely burned. Test results of a 56,000 kcal/hr burner showed that at 90 pre-mixing rate, total nitrogen compounds in the combustion gas including nitric oxide, hydrogen cyanide, and ammonia decreased with decreasing air-fuel ratio. The second stage combustion was diffusion combustion, and 10 to 70% of the thermal NO was controllable by revision of combustion through dividing and enlargement of flame and by wall surface combustion. The burner was used for a 8.4 tons/hr boiler and at 100% load (5.5 million kcal/h), the total NOx in flue gas was 35 ppm.

49737 **APTIC NO. 71611**

Offhaus, Ekkehard

ANIMAL CARCASS DISPOSAL FREE OF ODOR. *(Tierkoerperbeseitigung frei von Gestank). Text in German. Umwelt (Duesseldorf), 4(6):41-43, 1974.*

The state of Bavaria has 21 animal carcass treatment stations whose operation and equipment no longer fulfill demands concerning environmental protection. New regulations call for a reduction of the number of these to eight centrally located stations which will be equipped with the most modern facilities for air cleaning. The first such plant is under construction in Plattling, Bavaria. It will comprise two parts, the modernized old plant and a new complex operated by the Alfa-Laval- Centrimeal-system. All waste air will be drawn off immediately at the point of origin. Most of the processes will take place in fully encapsulated surroundings to avoid uncontrollable emission sources. The waste air deodorizer comprises three multichamber cross flow scrubbers, each with a throughput of 60,000 cu m/h. Sodium hypochlorite and sulfuric acid will be used as scrubbing fluids to remove such typical odors as mercaptans and amines by chemosorption. The scrubber has been successfully tested in practice and its operation costs are low, its life-time is high, and the degree of efficiency excellent.

49738 **APTIC NO. 71631**

Oheimb, Rainer von

NON-ODOROUS COMMERCIAL LAYING HEN STATIONS. *(Umweltfreundliche Intensivhaltung von Legehennen). Text in German. Landtechnik, 29(11):506-507, Nov. 1974*

An economical drying system for the feces of laying hens kept in 3-story cage stations is described. The individual stories were separated by a 0.13 mm plastic conveyor belt. For drying of the feces on the conveyor belts air hoses consisting of 0.2 mm rigid polyethylene equipped with 13 mm nozzles at intervals of 75 mm were installed. An axial blower installed at each end of the air hose supplied the air for drying. For each hen 0.13 cu m drying air/min was used, which reduced the moisture content to 25%. The conveyor belt moved with a speed of one cage length per 7 days. For odorless storage of the feces dried this way the moisture content was further reduced in a warm air drier to between 15 and 10% after removal from the laying hen station. For cold air drying in the station either fresh air drawn from outside or air drawn from inside can be used, depending on individual needs. The ammonia concentration in the waste air varied between 0.37 and 0.26 ppm.

49739 **APTIC NO. 72214**

Olschewski, K. H. and W. Posch

MAXIMIZING THE INJECTION OF HYDROCARBONS IN THE BLAST FURNACE. *(Die Maximierung der Einduesung von Kohlenwasserstoffen im Hochofen). Text in German. Radex-Rundschau (Austria), 1974(4):241-249, 1974. 9 refs.*

Maximized fuel oil injection for blast furnaces is reviewed in relation to minimum pollutant formation. Topics covered include: theoretical considerations dealing with combustion in the tuyere level and constant gas ratios in the overall blast furnace process; cost considerations involving fuel oil and coke; and investigations studying the preparation, spraying, mixing, and combustion of fuel oil with minimum soot formation within sub-stoichiometric limits and under optimum combustion conditions at the tuyere level.

49740 **APTIC NO. 72065**

Onishi, Shigeru

TWO-CYCLE INTERNAL COMBUSTION ENGINE. *(Assignee not given.) U. S. Pat. 3,817,227. 8p., June 18, 1974. 10 refs. (Appl. Feb. 22, 1972, 7 claims).*

An improved two-cycle internal combustion engine is described that provides for greater combustion efficiency given at relatively low fuel-air ratios and thus reduces exhaust emissions. The engine employs an electric ignition system and is characterized by a combustion recess inside the cylinder head which becomes gradually deeper in the direction of gas flow in the cylinder. A device for controlling the quantity of fuel supply and a device for controlling the exhaust gas flow are operated in relation to each other that at part-load operation the gas mixture flow into the cylinder is reasonably slowed and stratified. The gas mixture is thus securely sent into the recess space where stable combustion is maintained in each cycle even at low fuel-air ratios. Carbon monoxide emissions are reduced to about 1/10 the levels associated with prior-art two-cycle engines, and hydrocarbon emissions are reduced by approximately 1/2. Nitrogen oxides are inherently low as for all two-cycle engines with large residual gas components.

49741 **APTIC NO. 75096**

Ottmers, D. M., Jr., J. L. Phillips, C. E. Burklin, W. E. Corbett, N. P. Phillips, and C. T. Shelton

A THEORETICAL AND EXPERIMENTAL STUDY OF THE LIME/LIMESTONE WET SCRUBBING PROCESS (FINAL REPORT). *Radian Corp., Austin, Tex., Environmental Protection Agency Contract 68-02-0023, Program Element 1AB013, ROAP 21ACY-031, Rept. EPA-650/2-75-006, 331p., Dec. 1974. 61 refs.*

Technical efforts relating to the development of lime/limestone scrubbing processes for the removal sulfur oxides from stack gas are described. Topics covered include: a review of a portion of the test plan for the Environmental Protection Agency s prototype test facility at the Tennessee Valley Authority s Shawnee Station; laboratory studies concerning key reaction steps, including lime and limestone dissolution rates and calcium sulfite and sulfate precipitation rates; and engineering and chemistry support for pilot unit studies at Combustion Engineering s Kreisinger Development Laboratory, including test program design, on-site sampling, and chemical analysis of test samples. Assistance with the analytical data system at EPA s prototype test facility is also covered.

49742 **APTIC NO. 71868**

Ouwerkerk, Cornelis and Enno Frank Wijn

PROCESS FOR THE SELECTIVE REMOVAL OF HYDROGEN FROM GASES CONTAINING HYDROGEN SULPHIDE AND CARBON DIOXIDE. *(Shell Internationale Research Maatschappij n.v., The Hague (Netherlands)) Brit. Pat. 1,362,384. 5p., Aug. 7, 1974. (Appl. July 13, 1971, 10 claims).*

A process for increased selectivity of hydrogen sulfide removal from stack gases containing both hydrogen sulfide and carbon dioxide is described. The gas is contacted with an alkanolamine solution in a tray column at a temperature below 45 C at a gas velocity of 2-4 m/sec. The resulting ratio of hydrogen sulfide in the feed gas to that in the treated gas is at least 30, while less than 30% of the carbon dioxide present in the feed gas is absorbed. The total dispersion of the absorbent in the tray column is the product of the number of trays and the dispersion height per tray, and for a given gas velocity this product may be considered as roughly constant for a tray column with fewer than 20 contacting trays at gas velocities of from 1-4 m/sec.

49743 **APTIC NO. 71792**

Paradi, Laszlo

PROBLEMS OF ENVIRONMENTAL PROTECTION AT THE SUGAR FACTORY AT ACS, HUNGARY. *(Kornvezetvedelmi feladatok az Acsi cukorgyarban). Text in Hungarian. Tatabanyai Szenbanyak Muszaki-gazdasagi Kozl., 14(2-3):111-114, April-Sept. 1974. 10 refs.*

Water and air pollution problems at the Acs sugar factory in Hungary are described in connection with planned modernization. The main air pollutant emission sources are the boilerhouse, the beet pulp drying cyclone, the slag dump, and the diffusor waste water storage basin. As the slag dump and the diffusor waste water storage basin will become unnecessary as a result of modernization, essential abatement of the air pollutant emissions will be achieved by the switchover to oil firing, and by the use of a beet pulp drier with separate firing.

49744 **APTIC NO. 71955**

Paraskos, J. A., A. A. Montagna, and L. W. Brunn

ECOLOGICALLY ACCEPTABLE FUELS FROM THE GULF HDS PROCESS. *Preprint, American Inst. of Chemical Engineers, New York, 35p., 1974 (?). 17 refs. (Presented at the American Institute of Chemical Engineers Annual Meeting, 67th, Washington, D. C., Dec. 1-5, 1974.)*

The Gulf residuum hydrodesulfurization process (Gulf HDS) and the production of ecologically acceptable fuels are described. Sulfur is removed by contacting the liquid feed with hydrogen at elevated temperature and pressure and passing the resulting mixture downflow over a fixed-bed, trickle-flow reactor containing the catalyst. The addition of a flash zone and further reactor sections distinguishes the Type III and IV processes from the Type II process, a first generation unit. The maximum design severity for Type III HDS is equivalent to about 0.3% S, 375 F+ fuel oil from 50% reduced Kuwait crude, while that for Type IV is about equivalent to 0.1% S, 375 F+ fuel oil produced from the same source. Other residua can be used which may allow higher or lower product S levels in each design depending upon the nature of the feedstocks. The Type III and Type IV processes offer more efficient S removal than would be derived by merely extending the catalyst volume used in Type II process. Decreased catalyst aging rates, higher overall rates of desulfurization, and lower S levels are attainable with the Type III and Type IV systems than a comparable-size Type II system. Pilot plant studies of Types II, III, and IV processes are described in which various residua are desulfurized.

49745 **APTIC NO. 71685**

Pasbrig, Max

MEANS FOR USE IN CONJUNCTION WITH A CARBURETOR OF AN INTERNAL COMBUSTION ENGINE FOR IMPROVING THE COMBUSTION OF FUEL. *(Lacrex Brevetti S.A., Minusio (Switzerland)) U. S. Pat. 3,826,235, 6p., July 30, 1974, 5 refs. (Appl. Nov. 14, 1972, 12 claims).*

A device for improving the homogeneity of the fuel-air mixture delivered to a carburetor-equipped internal combustion engine is described. The apparatus consists of an atomizer sleeve located in the suction channel behind the throttle valve of the engine's carburetor. The atomizer sleeve is provided with guide elements possessing radially extending impact elements and throughpassage openings. The guide elements extend over the entire cross section of the suction flow and are arranged in a spaced relationship with respect to one another. The end of the atomizer sleeve neighboring the throttle valve is provided with a segmented spherical-shaped recess that has a configuration corresponding to the compartment swept by one-half the throttle valve upon its opening. The atomizing arrangement allows for more complete combustion and hence less exhaust emissions.

49746 **APTIC NO. 69552**

Paul, Frank W., Nelson A. Macken, and Minel Negreanu

APPLIED STUDIES IN ADVANCED BOILER TECHNOLOGY FOR AUTOMOTIVE RANKINE CYCLE ENGINES (ANNUAL PROGRESS REPORT). *Carnegie Mellon Univ., Pittsburgh, Pa., Dept. of Mechanical Engineering, Environmental Protection Agency Grant R802466, PR EPA 1, 71p., Jan. 1974, 49 refs.*

Alternative heat transfer technology and design concepts for an improved vapor generator design for application in the closed Rankine cycle heat engines are identified. The major heat transfer limitation in a vapor generator is the gas side heat transfer coefficient which in present designs is one or two orders of magnitude smaller than the thermal conduction and working side fluid coefficients. This limits the maximum heat flux which can be transferred to the working fluid. Monotube vapor generators are inherently slow in their transient response characteristics, having equivalent linear time constants of the order of 20 sec and larger. A cylindrical boiler design was analyzed for heat transfer and stress on a preliminary design basis A limiting constraint is the gas-side combustion surface area required for heat transfer. Mathematical modeling is defining the transient response characteristics. (Author abstract modified)

49747 **APTIC NO. 71978**

Pilat, Michael J.

FUTURE NEEDS FOR FINE PARTICULATE SCRUBBER CAPABILITIES. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 229-230. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

Future needs for fine particle scrubber capabilities are outlined along with some reasons for using wet scrubbers. Wet scrubbing is particularly advantageous as compared to other particle collection methods for applications involving the treatment of wet, corrosive, and/or explosive gases and the simultaneous collection of particulate and gaseous pollutants. Future research needs in fine particle scrubbing include: experimental studies relating the scrubber particle efficiency as a function of particle size to the scrubber design and operating parameters; studies of scrubber particle collection mechanisms on a micro-scale; the development of improved test methods and instrumentation for measuring particle properties and scrubber operating parameters; and the development of scrubbers capable of collecting 99+% of fine particles (0.02-2 micron diameter) and having outlet particle concentrations in the 229-2290 micrograms/cu m range.

49748 **APTIC NO. 72066**

Priegel, Jack C.

ELECTRONIC CARBURETION SYSTEM FOR LOW EXHAUST EMISSIONS OF INTERNAL COMBUSTION ENGINES. *(Assignee not given.) U. S. Pat. 3,817,225, 11p., June 18, 1974. 16 refs. (Appl. March 10, 1971, 19 claims).*

An electronic carburetion system for internal combustion engines is described that, unlike prior-art devices of similar nature, permits comparison between the actual fuel flow rate and the measured mass air flow rate, thus achieving constant control of the air/fuel ratio and reductions in exhaust emissions. The air flow rate to the engine is converted into a proportional electrical signal which flows to a signal summing unit. The fuel flow rate from a fuel pump is controlled by a signal received from the signal summing unit, thus providing for a controlled fuel flow to the engine which is proportional to the air flow. The exact flow rate from the fuel pump is measured and converted into another proportional electrical signal which is fed back to the summing unit, thus forming a closed loop circuit. The summing unit compares the first signal with the second and changes the fuel flow rate the required amount to maintain the air/fuel ratio at a predetermined value. Optional circuitry is also provided for linking measurements of warm-up enrichment, acceleration enrichment, temperature, and barometric pressure with the summing unit, thus providing extremely close control over all parameters affecting the air/fuel ratio. (Author abstract modified)

49749 **APTIC NO. 71650**

Pustovit, V. T., Y. A. Tarasenko, and L. Y. Khil chenko

REMOVAL OF MERCURY FROM GASEOUS EMISSION FROM CHLORINE ELECTROLYZERS. *(Ochistka gazovykh vybrosov khlornykh elektrolizerov ot rtuti). Text in Russian. Khim. Tekhnol., no. 5:36-37, 1974.*

The problem of mercury emissions from mercury-cathode electrolyzers for chlorine and sodium production are discussed. Most of the mercury present in the waste gases originates in the alkaline compartment of the electrolyzer, while the chlorine dissolved in the anolite in the acid compartment reacts with the mercury vapors; most of the mercuric chloride thus formed is retained in the anolite. The waste gases from the alkaline compartment contain high concentrations of mercury due to the absence of chlorine. These waste gases are cleaned by water-sprayed scrubbers in which the chlorine and mercuric chloride are dissolved in the scrubbing water, whereas metallic mercury escapes into the atmosphere in concentrations far above the maximum allowable value. In electrolyzers without the alkaline compartment the mercury vapor-saturated hydrogen passes through the chlorine anolite, which results in complete removal of mercury from the waste gases. It is thus possible to considerably abate mercury emissions by elimination of the mercury seal. Excess sludge formation resulting in an intense release of hydrogen should be avoided to minimize mercury emissions.

49750 **APTIC NO. 72012**

Quagliarello, Daniel J.

NAVAL ORDNANCE RDTE PROGRAMS POLLUTION ABATEMENT. *In: Proceedings of the First Conference on the Environmental Effects of Explosives and Explosions (May 30-31, 1973) (Final Report). Naval Ordnance Systems Command Proj. F53-554, Task ORD-332-005/UF 53-554-301, Program Element 62755N, NOLTR 73-223, p. 4-14, Feb. 1974.*

NTIS, DDC: AD 777 403

The degradation and disposal of reject or overage solid propellants, both in the as-manufactured state and those already incorporated in missile propulsion units, are discussed. Detonation creates air and noise pollution and controlled incineration creates smoke and gases resulting in air pollution. Exhaust systems and scrubbers are installed at many explosive loading facilities to safely and efficiently remove dusts and fumes. The major combustion products of single- and double-base propellants are carbon dioxide, carbon monoxide, water, nitrogen, nitric acid, and metallized salts from aluminum and burning rate modifiers. Nitrous oxide, nitrogen oxides, and hydrocarbon gases are also produced. The CO is oxidized to CO_2 and a scrubber reduces the NO_x to less than 40 ppm. The water phase is treated with ammonia to convert the approximately 1% HNO_3 solution to ammonium nitrate and to remove metals such as lead. The resulting ammonium nitrate solution is concentrated to 20% by reverse osmosis and used as fertilizer. The effluent, dilute ammonium nitrate solution (0.01%) is recycled to the oxidation system. Other techniques under consideration by the Navy are the fluidized bed process and the molten salt process.

49751 **APTIC NO. 71528**

Quig, Robert H.

CHEMICO EXPERIENCE FOR SO_2 EMISSION CONTROL ON COAL-FIRED BOILERS. *Preprint, National Coal Assoc., Washington, D. C., 59p., 1974. 16 refs. (Presented at the Coal and the Environment Technical Conference, Louisville, Ky., Oct. 23, 1974.)*

The operation of various sulfur dioxide venturi scrubbing installations at coal-fired power plants is reviewed. Types of SO_2-removal processes covered include: alkaline fly ash slurry scrubbing, lime-limestone additive scrubbing, and magnesium oxide regenerative recycle scrubbing. Each system is summarized in terms of process description, number and types of application, problems of operability. Performance results (removal efficiency), and process economics. Ongoing research regarding electrostatic precipitator-spray tower systems and an elemental sulfur recovery process (Phosphate Process) is also summarized. Elemental sulfur recovery appears to offer an alternative to sludge disposal, especially when by-product acid recovery is not a satisfactory arrangement.

49752 **APTIC NO. 71684**

Quigg, Harold T.

COMBUSTION PROCESS WITH SELECTIVE HEATING OF COMBUSTION AND QUENCH AIR. *(Phillips Petroleum Co., Bartlesville, Okla.) U. S. Pat. 3,826,078. 15p., July 30, 1974. 4 refs. (Appl. March 27, 1972, 22 claims).*

A gas turbine combustion process that results in reduced nitrogen oxide emissions is described that provides for the heat exchanging of turbine exhaust gases with dilution of quench air instead of primary inlet air, thus reducing the temperature of the latter without affecting combustion efficiency. A stream of air and fuel are passed first into a primary combustion region and then to a secondary combustion region where the temperature is 100-500 F greater than the temperature of the primary zone. A portion of a separate stream of air heated by the exhaust stream in a heat energy utilization zone is passed into a quench region of the combustion zone. The equivalence ratio in the primary combustion region is greater than stoichiometric and is adjusted such that NO_x emissions are less than 5 lb/1000 lb fuel burned.

49753 **APTIC NO. 71798**

Rapp, Tamas

THE AIR POLLUTION-ABATING EFFECT OF MODERN DOMESTIC HEATING EQUIPMENT. *(A korszeru lakossagi tuzeles levegoszennyezest merseklo hatasa). Text in Hungarian. Energiagazdalkodas, 15(10):450-452, Oct. 1974. 12 refs.*

Problems of air pollution generated by domestic and institutional heating equipment and possibilities of its abatement are described. Dust, soot, fly ash, sulfur dioxide, carbon monoxide, and nitrogen oxides are the major air pollutants generated by heating equipment. These emissions can be substantially abated by a change to natural gas or low-sulfur or sulfur-free fuels, electricity, central heating, and remote heating. Appropriate design of heating equipment; adequate use, adjustment, maintenance, and inspection of firing equipment; and the abandonment of obsolete equipment are essential for emission abatement. The soot emission from central heating boilers reduced from 300 to 50 mg/kg or less after adjustment, and increases of 1 to 10% were achieved in the efficiency.

49754 **APTIC NO. 71565**

Reed, T. B., R. M. Lerner, E. D. Hinkley, and R. E. Fahey

IMPROVED PERFORMANCE OF INTERNAL COMBUSITON ENGINES USING 5-30% METHANOL IN GASOLINE. *Preprint, Lincoln Lab., Lexington, Mass. and Massachusetts Inst. of Tech., Cambridge, The Energy Lab., 4p., 1974. 12 refs.*

Vehicle performance, fuel economy, and exhaust emissions were measured during road tests of various unmodified automobiles (model years 1968-1974) using mixtures of methanol and gasoline. Carbon monoxide emissions were reduced from between 20-70% with mixtures containing from 5-15% methanol. Fuel economy and performance were increased. The improved performance with methanol addition was attributed to chemical leaning plus the dissociation of methanol near 200 C, leading to the absorption of energy during the compression stroke of the engine and the release of up to 40% hydrogen for a 10% mixture.

49755 **APTIC NO. 69428**

Reynolds, R. W., J. S. Smith, and I. Steinmetz

METHYL ETHERS AS MOTOR FUEL COMPONENTS. *Preprint, American Chemical Society, Washington, D. C., Div. of Petroleum Chemistry, 21p., 1974. (Presented at the American Chemical Society, National Meeting, 168th, Atlantic City, N. J., 1974, Paper 11.)*

Oxygenated hydrocarbons are being considered for use as high octane motor fuels because the gasoline supply potentially could be increased by conversion of fossil fuels to oxygenated hydrocarbons. The use of high octane oxygenated hydrocarbons could permit an increase in the antiknock quality of unleaded gasoline which would allow the use of higher compression ratios, thus improving fuel economy and lowering emission levels. Many oxygenated hydrocarbons, both alcohols and ethers were tested for motor fuels. Methyl tertiary butyl ether (MTBE) was selected for further evaluation. Experiments applying MTBE in unleaded gasoline and the etherification process are discussed. The MTBE was evaluated in engine, chassis dynamometer, exhaust emission, safety, and toxicological acceptability studies. An unleaded gasoline containing 15 vol% MTBE was tested f[illegible] than 1 yr in employee-driven cars which accumulated [illegible] of 120,000 mi. The MTBE was a suitable compo[illegible] unleaded gasolines in concentrations up to 15 vol%. [illegible] of MTBE in motor fuels overcame many of the problems [illegible] with methanol and other low molecular weight alcohols. [illegible] MTBE can be made easily by reaction of isobutene and methanol. The chargestocks can be obtained from conventional refinery streams or produced from coal synthesis gas. (Author summary modified)

49756 **APTIC NO. 71976**

Rich, Stanley R. and Theophanes G. Pantazelos

FLUX FORCE CONDENSATION ASPIRATIVE WET SCRUBBING OF SUB-MICRON PARTICLES. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 194-206. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

An aspirative wet scrubber that utilizes condensation forces to enhance fine particulate collection is described. A pressure gain of 2-4 in. is generated by the system, and the total water pump power requirements for multi-stage systems are 2 hp/1000 SCFM of gas throughput. No fans or blowers are utilized. Field tests of the device serving a kiln producing 0.1-6.0 micron metal oxide particles indicated a total collection efficiency of 99.4%. The collection of fly ash (0.1-10 micron range) from a simulated stack gas created by a salamander powered by number 2 fuel oil was measured at 99.5% efficiency. (Author abstract modified)

49757 **APTIC NO. 72041**

Sakamoto, Hironobu

TRENDS IN EXHAUST GAS DESULFURIZATION. *(Haien datsuryu no doko). Text in Japanese. Idemitsu Sekiyu Gijutsu (Idemitsu Pet. J.), 17(6):476-484, 1974. 4 refs.*

New environmental standards for sulfur oxides have forced industry to import low sulfur fuel and install exhaust gas desulfurization units. The number of the latter has increased remarkably since 1973. Some of the processes reviewed here the activated carbon process, the Shell Co. dry process, the Wellman-Lord process, the Kureha-Kawasaki process, the Mitsubishi lime-plaster process, and the Chemico process.

49758 **APTIC NO. 69271**

Santiago, Andres

METHOD FOR DETOXIFICATION OF EXHAUST GASES OF INTERNAL COMBUSTION ENGINES. *(Zeuna-Staerker KG, Augsburg (West Germany)) U. S. Pat. 3,803,839. 5p., April 16, 1974. 7 refs. (Appl. Sept. 13, 1971, 4 claims).*

An afterburner and catalyzer arrangement for reducing carbon monoxide, hydrocarbon, and nitrogen oxide emissions from motor vehicle internal combustion engines is described which precludes the danger of nitrogen dioxide formation associated with similar combinations employing excess air in afterburning. The proportions of hydrocarbons and CO in the exhaust are first diminished by oxidation in the afterburner; exhaust gas is then fed to a catalyzer where the remaining CO is reacted with the NOx to produce harmless reaction products. The improvement consists of supplying by controllable air supply means to a point downstream of the engine exhaust outlet an air volume sufficient for only partial diminution of the CO such that the remaining CO corresponds to about 10 times the volume proportion of the NOx in the exhaust. The stoichiometric proportions of CO and NOx are thus reacted, with the NOx being reduced to nitrogen and the CO being oxidized to CO2.

49759 **APTIC NO. 71573**

Sarto, Jorma O.

IMPROVEMENTS IN OR RELATING TO THE RECYCLING OF EXHAUST GASES IN INTERNAL COMBUSTION ENGINES. *(Chrysler Corp., Highland Park, Mich.) Brit. Pat. 1,361,545. 6p., July 24, 1974. (Appl. Jan 28, 1972, 17 claims).*

An exhaust gas recirculation method for reducing nitrogen oxide emissions from internal combustion engines is described that avoids the accumulation of lead oxide deposits in the bypass conduit by cooling the exhaust gases to be recycled to between 550-700 F. The exhaust gases are cooled in a chamber communicating with, but out of the direct path of, the hot exhaust flow from the engine. The chamber s sidewalls are exposed to the atmosphere for dissipating heat lost from the exhaust gas stream. The exhaust gases are thus cooled sufficiently to solidify a major proportion of the lead contaminants. A portion of the cooled exhaust is then recycled from the chamber through a metering restriction to the air inlet to reduce the formation of nitrogen oxides.

49760 **APTIC NO. 72064**

Sarto, Jorma O.

EXHAUST RECIRCULATION. *(Chrysler Corp., Highland Park, Mich.) U. S. Pat. 3,817,230. 6p., June 18, 1974. 5 refs. (Appl. Sept. 21, 1972, 11 claims).*

An exhaust gas recirculation system for the reduction of nitrogen oxides in automobile exhaust is described that provides for the reduction of recirculation during engine idling without the prior-art complexities of moving parts. The system also achieves preheating and improved mixing and carburetion of the fuel-air mixture in the inlet header. Exhaust gases are recycled by means of a swirl chamber which receives the gases at a restricted opening in its upstream end. The chamber is in heat exchange relationship with the conventional intake manifold hot spot to facilitate heating of the latter. The swirl chamber discharges the hot exhaust gases at a restricted opening in its downstream end in opposition to the inlet flow of the fuel-air mixture at a location directly below the throttle valve. A second restricted duct opens into the induction conduit upstream of the throttle valve to receive inlet gases during idle and discharges tangentially into the swirl chamber to effect a swirling gas motion therein to inhibit exhaust flow during engine idle operation. The downstream end of the chamber consists of a thin plate adapted to flex with changing operating temperatures for the dislodging of exhaust gas contaminants adjacent its opening. (Author abstract modified)

49761 **APTIC NO. 75060**

Schreiber, R. J., A. W. Davis, J. M. Delacy, Y. H. Chang, and H. N. Lockwood

BOILER MODIFICATION COST SURVEY FOR SULFUR OXIDES CONTROL BY FUEL SUBSTITUTION (FINAL REPORT). *Aerotherm/Acurex Corp., Mountain View, Calif., Environmental Protection Agency Contract 68-02-1318, Program Element 1ABO13, ROAP 21ADE-010, Task 9, Rept. EPA-650/2-74-123, Rept. 74-113, 113p., Nov. 1974. 88 refs.*

NTIS: PB 239455/AS

The capital costs associated with converting industrial and utility boilers from conventional high-sulfur fossil fuels to low-sulfur products from selected coal conversion processes were identified. The substitute fuels included solvent refined coal in the solid and hot liquid phases as well as lower-Buty gas. Conversion to liquid solvent refined coal was the most expensive, followed by gaseous fuels and then solid solvent refined coal. The costs of all conversion strategies increased exponentially with boiler capacity and were a weak function of boiler design.

49762 **APTIC NO. 71827**

Seiji, Kanamori

LOW NOX BURNER OF BORUKANO CO. *(Borukano no tei NOx bana). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(12):47-51, Dec. 1974.*

Three types of low nitrogen oxides burner are described. A self-bias burner was designed by allowing the excess air region and excess fuel region to form on the same circumference with a single flame. Two-stage combustion with different arrangement of second stage airports was studied for the optimum relative position between burner and the airports. A waste gas recirculation burner utilized a fan to introduce a portion of waste gas into the air duct. Test results of the self-bias atomizer showed 20-40% NOx reduction at waste gas oxygen below 5% as compared to the conventional atomizer. Results also revealed that combination of the above three methods could reduce up to 50% NOx at 2-3% O2 with 25% second stage air ratio and 25% waste gas recirculation.

49763 **APTIC NO. 71714**

Shigemitsu, Hidenori

LINE-GYPSUM METHOD OF TOHOKU DENRYOKU, MISUBISHI JUKO. *(Tohoku Denryoku no sekkai-sekko ho, Mitsubishi Juko, ni tsuite). Text in Japanese. (Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 18(12):54-57, Dec. 1974.*

The desulfurization plant at the Hachinohe Power Station used lime slurry. A cooling tower removed 70 to 80% of the dust content from flue gas before the gas enters an absorption tower where sulfur dioxide gas reacts with calcium hydroxide to form calcium sulfite. The calcium sulfite is oxidized at an oxidation tower to produce gypsum (2436 kg/hr). The maximum sulfur oxides levels at the inlet and outlet of the absorption tower are 821 ppm and 115 ppm, and the desulfurization efficiency is better than 86%. The amount of flue gas treated ranges from 380,000 to 140,000 N cu m/hr. The cooling tower employs a countercurrent spray method and its dimensions are 60 sq m base by 23.3 m height. The absorption tower was a cocurrent spray and its dimensions are 50 sq m base by 24.6 m height. When the operation is at low load, clogs accumulate within the lime slurry supplier, thus the supplier has a drainage system to remove precipitations from the lime slurry.

49764 **APTIC NO. 68050**

Shimizu, Keiji

EXAMPLES OF ODOR CONTROL MEASURES BY OIL REFINERIES. *(Seiyusho ni okeru akushu taisaku ni jirei). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 35-38, 1974. (Presented at the Japan Petroleum Institute Seminar, 17th, Tokyo, Japan, Sept. 25-26, 1974, Paper 9.)*

The measures taken to control odors in an oil refinery are described. Since concentration, composition, and individual reactions influence definitions of what are unpleasant odors, it was assumed that all odors were unpleasant. Attempts were made to decrease the concentrations of odor-causing substances in the refinery to about 1/10 to 1/40 of the concentrations permitted by law. The strength of the odors within the refinery areas was to be such that the odors were recognizable, but only at a very low level. The refinery equipment and operations were checked to see what measures could be taken to combat odor. In addition, twenty odor monitors were selected to patrol the boundaries and thy grounds of the refinery for odors. Incineration, adsorption on activated charcoal, and scrubbers were used to combat odors. However, it is important to improve existing equipment and operating procedures and minimize leakage, prior to installation of odor-controlling equipment. Tables and diagrams are included.

49765 **APTIC NO. 71736**

Shimizu, Shozo, Tetsumi Iwase, Hideki Hara, Ryuzo Hori, and Shigenori Sakurai

PROCESS FOR PRODUCING A CATALYST. *(Toyota Jidoshe Kogyo Kabushiki Kaisha, Toyota (Japan)) U. S. Pat. 3,816,344. 6p., June 11, 1974. (Appl. June 23, 1972, 10 claims).*

A method for depositing a noble metal on a carrier to produce a catalyst with improved effectiveness for the oxidation of carbon monoxide and hydrocarbons or the reduction of nitrogen oxides in automobile exhausts is described. The process achieved a higher catalyst efficiency than prior-art processes because the noble metal film is deposited on the carrier surface without substantial penetration of the carrier. The production technique involves first immersing the carrier (alumina, silica, magnesia, or mixtures thereof) in a dilute solution of a noble metal salt (chlorides or nitrates of gold, platinum, rhodium, or palladium) and then drying the wet carrier to allow a precipitation core to deposit on the carrier surface. The carrier is then immersed in a second solution containing a noble metal salt (chloroplatinic acid, platinum chloride, palladium nitrate, palladium sulfate, tertraamine palladium, rhodium chloride, rhodium sulfate, or rhodium nitrate), a reducing agent (formalin, sodium formate, sodium hypophosphite, hydrazine, hydrosulfite, hydroboric acid, sodium borohydride, hydroquinone, or urea), and a stabilizer (disodium ethylenediaminetetraacetate, Rochelle salt, sodium tartrate, sodium citrate, ammonium chloride, ammonium nitrate, ammonium sulfate, methyl ethyl ketone, acetone, or 2,2-dithioethanol) to form a film of the noble metal on the carrier surface.

49766 **APTIC NO. 72218**

Shimoyamada, Tomiyasu

FUNDAMENTAL STUDY OF MANGANESE DIOXIDE FOR CATALYTIC RECOMBUSTION OF EXHAUST GAS OF MOTOR CAR. *(Jidosha haigasu no shokubai shiki sainensho sochiyo nisank mangan no kisoteki kenkyu). Text in Japanese. Fukushima Kogyo Koto Senmon Gakko Kiyo (Mem. Fukushima Tech. Coll.), 10(1):32-38, 1974. 22 refs.*

The catalytic activities of five manganese dioxide preparations were tested in a pulse reactor to assess their carbon monoxide-oxidizing capability in relation to the catalytic afterburning of automobile exhaust gases. Catalysts prepared from manganese sulfate showed diminished catalytic activity as a result of sulfate poisoning. Higher oxidation activity was obtained with a catalyst prepared by precipitating the permanganate salt in acidic solution. Two forms of carbon monoxide adsorption were demonstrated, each with a characteristic activation energy and reaction temperature.

49767 **APTIC NO. 72331**

Siepmann, R.

CATALYTIC AFTERBURNING OF SMALL QUANTITIES OF WASTE GASES WITH MASS-PRODUCED REACTORS. *(Katalytische Nachverbrennung kleiner Abgasmengen mit serienmaessig gefertigen Reaktoren). Text in German. Dechema Monograph., 75(1452-1485):167-181, 1974. 2 refs.*

The advantages of honeycomb tube catalysts for catalytic afterburning of waste gases are discussed. Reactors have been designed which can be manufactured and supplied as packaged units for a large number of waste gas emitters, particularly diesel-engined vehicles and industrial plants with small amounts of waste gas. In practical operation a high efficiency throughout the expected service life was demonstrated. Honeycomb tube catalysts have also been developed for Otto engine exhaust gases, for nitric oxide reduction and carbon monoxide and hydrocarbon oxidation, as well as for simultaneous removal of these noxious substances in the embedding process.

49768 **APTIC NO. 72211**

Sohonyay, Tibor

ENVIRONMENTAL PROTECTION AND MOTORIZATION. *(Kornyezetvedelem es motorizacio). Text in Hungarian. Jarmuvek Mezogazd. Gepek, 21(11):415-421, Nov. 1974. 8 refs.*

Air pollution due to automotive exhaust emissions, and possibilities of its abatement are described. It is possible to limit the carbon monoxide emission to 1%, and the unburnt hydrocarbon emission to 0.02% by proper design and adjustment of the ignition and carburetor system. The catalytic afterburners in new American cars have high efficiency but a rather short life of 10,000 to 13,000 km due to the poisoning action of lead. It would be possible to reduce the CO and nitrogen oxides emission by increasing the compression ratio to 22:1, which, however, would considerably reduce the power output. Fuel injection, compound vortex controlled combustion, and stratified charge combustion are used in new models with good result. The Stirling engine, used in experimental vehicles, emits negligible amounts of air pollutants, but it is not competitive with conventional engines due to its high price.

49769 **APTIC NO. 72068**

Sorgenti, Harold A.

PROCESS FOR THE DESULFURIZATION OF HYDROCARBONS. *(Atlantic Richfield Co., New York) U. S. Pat. 3,816,301. 8p., June 11, 1974. 2 refs. (Appl. June 30, 1972, 22 claims).*

A catalytic process for the removal of sulfur from fuel oils is described that overcomes prior-art limitations involving catalyst cost and availability, handling difficulties, and inefficient contact between reactants and catalyst. The process consists of preferentially oxidizing at least a portion of the sulfur in the sulfur-containing hydrocarbon material with an oxidant in the presence of a molybdenum-containing catalyst. The catalyst is prepared by interacting the molybdenum metal with at least one peroxy compound in the presence of at least one saturated aliphatic alcohol having from one to four carbon atoms per molecule to solubilize at least a portion of the molybdenum. The preferred peroxy compound is tertiary butyl hydroperoxide, and the preferred alcohol is tertiary butyl alcohol. The latter, which is removed from the oxidized sulfur-containing hydrocarbon material, can be dehydrated to isobutylene and further dimerized to form diisobutylene. The oxidized sulfur-containing hydrocarbon material is further processed by means of a sulfur-reducing step (e.g., base treatment, thermal treatment, solvent refining, hydrodesulfurization) to remove additional sulfur. (Author abstract modified)

49770 **APTIC NO. 71979**

Sparks, Leslie, E., Harold M. Haaland, Charles W. Lear, Robert C. Lorentz, James R. Martin Jack E. Phelan, and Alexander Weir, Jr.

PANEL DISCUSSION. *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 231-239. (May 28-30.) (Complete proceedings processed under APTIC 75055.)*

NTIS: PB 239335/AS

Various topics dealing with fine particle collection via wet scrubbing are discussed briefly. The topics covered include: the economic aspects of scrubber design, the concept of charged droplet scrubbing, applications of wet scrubber additives, and problems involved in scaling up particulate removal data from pilot plants to full size scrubbers.

49771 **APTIC NO. 68160**

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1973. *Bureau of Mines Information Circ., no. 8651:1-8, 1974. 169 refs.*

The Bureau of Mines energy research program during 1973 is reviewed and particular emphasis is placed on the development of new and improved methods for the discovery and production of oil and gas and the production of fluid fuels from coal. Research highlights related to problems of air pollution include: petroleum compositon studies to promote more efficient refining of low-lead gasoline and less vehicle exhaust pollutants; the use of coal-derived synthetic gas for motor vehicle fuel; the production of pipeline quality gas and low-Btu gas from coal gasification pilot plant processes; the production of pipeline gas from organic wastes (cattle manure); underground gasification of coal; flue-gas scrubbing systems for sulfur dioxide removal; the reduction of nitrogen oxides during coal and char combustion; respirable coal dust analyses in mines; the removal of fly ash from stack gases; air quality monitoring; catalytic and chemical desulfurization of coal; and the production of fuel oil from coal and solid wastes. Other topics covered include: magnetohydrodynamic generation of electrical power from coal, mines spoils reclamation with coal wastes, oil recovery from shale, and stimulative oil and natural gas production methods.

49772 **APTIC NO. 72177**

Steffens, Lester R.

DISPENSING VOLATILE HYDROCARBON FUELS. *(Mobil Oil Corp., New York) U. S. Pat. 3,826,291. 4p., July 30, 1974. 4 refs. (Appl. Dec. 11, 1972, 1 claim).*

A system for dispensing volatile hydrocarbon fuels (gasoline) from service station pumps to automotive fuel tanks without the loss of hydrocarbon vapors to the atmosphere is described. Vapor escape is avoided by withdrawing from the tank to be filled a volume of vapor equal to the volume of liquid delivered to it and transferring the withdrawn vapor to the dispensing tank in a volume equal to the volume of liquid withdrawn. The output shaft of a meter in the dispensing equipment drives a positive displacement vapor pump which takes suction from a point in the fill pipe of the automobile tank.

49773 **APTIC NO. 71526**

Stengle, W. B. and J. E. Holder

PULP AND PAPER MILL BLACK LIQUOR OXIDATION. *Preprint, Air Pollution Control Assoc. Pittsburgh, Pa., 10p., 1974. (Presented at the Air Pollution Control Association, Southern Section Meeting, Birmingham, Ala., Sept. 18, 1974.)*

Field tests of a black liquor oxidation method for reducing odorous emissions from a kraft pulp mill are reported. A heavy black liquor oxidizer lowered the average liquor sulfidity from 33.8 g/l to 0.29 g/l (99.1%) over a 3-month test period. Total reduced sulfur emissions were lowered from 500-800 ppm to less than 19 ppm for 76% of the time and below 4 ppm for 26% of the period. Final correlations of oxidizer efficiency and boiler TRS emissions indicated that the latter can be controlled to below 20 ppm a large percentage of the time with oxidizer efficiencies of 98-100%.

49774 **APTIC NO. 71865**

Stoneburner, George Robert and Ronald Stone Joyce

ADSORPTION OF HYDROCARBON FUEL VAPOURS. *(Calgon Corp., Pittsburgh, Pa.) Brit. Pat. 1,359,703. 4p., July 10, 1974. (Appl. June 29, 1971, 9 claims).*

A system for the adsorption of hydrocarbon vapors released from the fueling of automobiles and from normal breathing in filling station storage tanks is described. An adsorbent, preferably activated charcoal, surrounds the gasoline supply hose near its open end which in turn is adapted to fit into and occlude part of the filler orifice of the vehicle's fuel tank while the device for adsorbing fuel vapor occludes the rest of the orifice. Thus, air displaced from the fuel tank containing hydrocarbon fuel vapors must pass through the adsorbent. The invention also provides for a gasoline storage tank installed underground and fitted with a breathing device comprising a pipe connected at one end to the top of the tank and extending at least to ground level. A chamber containing activated carbon is situated above ground level and is connected to the other end of the pipe. A vent leads from the chamber to the atmosphere.

49775 **APTIC NO. 72243**

Suetaka, Toru

ADSORPTION TREATMENT OF ODOROUS GASES - STUDY OF VARIOUS ADSORBENTS. *(Akushu gasu no kyuchaku shori - kakushu kyuchakuzai ni tsuite no kento). Text in Japanese. Preprint, Japan Chemical Society, p. 657, 1974. (Presented at the Japan Chemical Society, Fall Meeting, 31st, Sendai, Japan, 1974, Paper 2Q19.)*

Adsorbents of 1 mm diameter were packed in a tube of 35 mm diameter and on the two sides glass balls of the same diameter (1 mm) were packed to eliminate possible terminal effects. Two gas detecting probes of the thermal conductivity type were inserted at the two ends of the adsorbent bed. The adsorbing tube was immersed in a constant temperature bath with hydrogen passing through the tube. A mixture of methyl sulfide and H_2 was then passed through the tube and the absorbing effects as well as the breaking curves of methyl sulfide were observed. Results showed that activated charcoal for gas purification gave the highest adsorbing effect followed by activated charcoal for water treatment. Copper sulfate gave the lowest effect as an adsorbent for methyl sulfide. The breaking curves were also analyzed.

49776 **APTIC NO. 71741**

Tanaka, T., M. Koizumi, and Y. Ishihara

MECHANISM OF SULFUR DIOXIDE ABSORPTION IN LIMESTONE SLURRY. *(Sekkaiseki kyushu ni yoru SO2 kyushu hanno kiko). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Daiichi Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. (No. 1) Electric Power Ind. Rept.), no. 73107, 23p., June, 1974. 14 refs.*

The dissolution rate of limestone in dilute hydrochloric acid was studied and the mechanism of sulfur dioxide absorption in limestone slurry was described. Limestones of various particle sizes (32/60, 60/80, 80/100 and 100/200 mesh) at various concentrations (1%, 3% and 5%) were titrated with 0.2 N HCl and the dissolution rates were calculated. The dissolution rate of limestone increased linearly with increasing hydrogen ion concentration and limestone concentration. It was also strongly dependent on particle size. A pH of higher than 6.0 is desirable for optimum SO_2 absorption rate in limestone solution at SO_2 concentrations of approximately 1000 ppm. Higher liquid-gas ratio, higher pH value of the absorbing solution, lower temperature, smaller particle size of limestone, and higher limestone concentration gave a higher rate of desulfurization.

49777 **APTIC NO. 68025**

Thede, Lars

ENVIRONMENTAL PROTECTION AT REXOLIN. *(Miljoskydd hos Rexolin). Text in Swedish. Kem. Tidsskr., 86(9):54-56, Sept. 1974. 2 refs.*

Environmental protection measures taken at Rexolin Chemicals AB in Helsingborg, Sweden, are described. The ammonia-containing waste gas from the synthesis of complex forming agents and carbamates is absorbed in two series absorbers placed one on top of thy other. The ammonia is first absorbed in the first stage using water with less than 5% ammonia from the second stage until an ammonia concentration of 10-20% is reached. Final purification is done in the second stage in which fresh water is used. Various organic waste gases and ammonia solutions are incinerated in a two-stage incinerator, with the first stage being used for incineration at 1600 C at an air excess coefficient of 0.75 to avoid nitrogen oxides formation, using waste gases with high calorific value or oil as an auxiliary fuel. The second and reaction chamber is used for the destruction of ammonia and waste gases with low calorific value at 1000 C. Scrubbing with water and airtight systems are used to reduce malodorous diethylamine emissions from dialkylaminoethanol synthesis.

49778 **APTIC NO. 72159**

Tourtellotte, John Francis and John Frederick Villiers-Fisher

CATALYTIC EXHAUST GAS TREATMENT APPARATUS. *(Chemical Construction Corp., New York) Brit. Pat. 1,366,061. 9p., Sept. 11, 1974. (Appl. Jan. 23, 1973, 11 claims).*

A catalytic afterburner for the oxidation of carbon monoxide and the reduction of nitrogen oxides in exhaust streams from internal combustion engines is described that minimizes external radiation losses and provides for such loss only at desired positions. The system consists of two cylindrical coaxial beds of catalyst mounted in a container with an exhaust gas inlet to the center of the inner bed and an air inlet between the beds. A gas outlet is situated external of the outer bed. The inner bed contains a catalyst for the reduction of nitrogen oxides, and the outer bed contains a catalyst for the oxidation of carbon monoxide and hydrocarbons.

49779 **APTIC NO. 72184**

Townsend, Rav T.

ROTARY INTERNAL COMBUSTION ENGINE AND METHOD OF COOLING THE SAME. *(Townsend Engineering Co., Des Moines, Iowa) U. S. Pat. 3,828,740. 12p., Aug. 13, 1974. 1 ref. (Appl. April 16, 1973, 9 claims).*

A rotary internal combustion engine in which the exhaust is passed out of the individual cylinders instead of through a common valve port is described that avoids excessive pressure and temperature from occurring in the cylinders during combustion. The cam plate of the engine consists of a pair of lobes positioned 180 deg apart. A slightly curved cam surface is provided on each of the lobes adjacent the position of maxium compression so that the pistons may partially move to an expanded position immediately after the point of maximum compression. Substantially complete combustion is thus achieved without causing excessive pressure and temperature in the cylinder. Ambient air is introduced directly into the cylinders for a time period greater than that consumed by the power portion of the expansion stroke of pistons after combustion to purge the exhaust gases and to cool the pistons and cylinder interiors.

49780 **APTIC NO. 71641**

Tsar kov, V. V. and V. A. Kuz menkov

DUST REMOVAL FROM FLUE GASES IN ORE DRESSING PLANTS. *(Ochistka ot pyli dymovykh gazov aglofabrik). Text in Russian. Metallurg, no. 12:37-39, Dec. 1974.*

The state of the art of and recommendations on dust separation from ore-dressing plant-generated dust are presented. The low dust separation efficiency of cyclone batteries (75-94%) can be improved by the recirculation of gas from the dust bunker. Electrostatic precipitators are unstable in their operation, with efficiencies ranging from 90 to 98%, which is due to variations in the chemical composition of the dust, as well as in the temperature, velocity, and humidity of the gases. Scrubbers may reach efficiencies of up to 95%, and low-pressure venturi scrubbers with a pressure drop of 100-150 mm of water column and a water consumption of 0.05 liter/cu m have efficiencies ranging from 92 to 96%. The dust emission can be reduced essentially by preliminary dust separation in the first and last vacuum chambers, or by increasing the separation efficiency in the collector by exhausting the gases from the zones with the lowest dust concentration. Sulfur dioxide can be efficiently removed by menas of alkaline solutions in wet scrubbers.

49781 **APTIC NO. 71778**

Tsuchiya, Koichi

LIMESTONE-GYPSUM METHOD OF CHUGOKU DENRYOKU, HITACHI. *(Chugoku Denryoku no sekkaisekisekkoho, Hitachi, ni tsuite). Text in Japanese. Sekiyu to Seikiyu Kagaku (Petrol. Petrochem.), 18(12):66-70, Dec. 1974.*

A desulfurization plant at Mizushima Power Station uses limestone as the absorber of sulfur dioxide gas. The plant consists of a limestone supplier that prepares 325 mesh limestone, and absorption tower to react sulfur dioxide with calcium carbonate to form calcium sulfite, and an oxidation tower to oxidize calcium sulfite to form gypsum. The desulfurization efficiency is better than 93% for 180 to 480 ppm SO2 at the absorption tower inlet, and the plant will handle a 1000 ppm SO2 level in the future. The plant handles 310,000 N cu m/hr of flue gas, and produces an average of 34 tons/day of gypsum of 98% purity and less than 10% water content. A special structure was used for the absorption tower and the tower is relatively small. No trouble has been reported for the 430 hr of operation since Nov. 1973, and remote operation of the plant is possible.

49782 **APTIC NO. 72355**

Tsuda, Harumasa

RECIRCULATION CONTROL APPARATUS FOR ENGINE EXHAUST GAS. *(Enjin no haigasu kangen seigyo sochi). Text in Japanese. (Toyo Industrial Co., Ltd., Hiroshima (Japan)) Japan. Model Util. Sho 49-42487. 4p., Nov. 20, 1974. (Appl. April 15, 1969).*

A device to control automobile exhaust gas recirculation is described. The exhaust gas is recirculated from the exhaust pipe to the engine intake manifold by a recirculation pipe which passes through a gas cooler, filter, and gas control apparatus. The gas control apparatus contains two butterfly valves, one of which is mechanically connected with the acceleration wire and the second of which is regulated by the movement of the first valve. The second valve closes only at idling condition and the first valve closes only at high speed condition. Therefore both valves open at normal driving conditions and the amount of circulating gas can be adjusted by the opening angles of the two valves.

49783 **APTIC NO. 71737**

Turner, Leslie C. and Harry Cockreham

ENERGY GENERATION SYSTEM ADAPTABLE FOR BURNING DUST-TYPE FUELS. *(Tureo Engineering, Inc., Lake Oswego, Oreg.) U. S. Pat. 3,824,937. 10p., July 23, 1974. 7 refs. (Appl. May 4, 1973, 21 claims).*

A combustion-type energy generation system, especially applicable to firetube boilers, that is capable of utilizing sawdust waste as its primary fuel (up to 90% of the total fuel composition) is described that overcomes prior-art limitations of excessive temperatures within the combustion chamber and incomplete fuel combustion. The system comprises a demand-responsive metering apparatus that controls the fuel/air ratio and mass flow rate of the dust fuel with a degree of accuracy comparable to that obtainable with gas and oil fuels. Dust fuel, normally of variable density, is fed from a large storage hopper into a metering bin sized to hold only a small volume of the fuel. A rotary agitator within the bin equalizes the density of the dust fuel and divides it into equal volumetric portions which are passed in succession over an opening in the bottom of the bin. The size of the opening is variably modulated by a reciprocating metering gate whose position is determined by a controller responsive to system energy demands. Small predetermined quantities of the fuel, dependent on the size of the opening, drop through the opening periodically and are transformed into a continuous homogeneous stream of dust fuel by a screw conveyor located below the opening. The conveyor feeds the stream of dust into a blower which transports the dust suspended in an air stream to a dust fuel burner. (Author abstract modified)

49784 **APTIC NO. 71960**

Turner, T. K.

PULP MILL BOILER EMISSION CONTROLS. CURRENT STATE OF THE ART. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1974. (Presented at the Air Pollution Control Association Southern Section Regional Meeting, Sept. 18, 1974.)*

The current state of the art for controlling particulate and sulfur dioxide emissions from pulp mill boilers is reviewed. Methods receiving serious consideration for the control of SO2 emissions from boilers include: catalytic oxidation, dry adsorption, and various scrubbing processes. Among the latter, only lime/limestone scrubbing and the Wellman Lord processes are commercially available. Scrubbers can also be used to clean particle-laden streams that are pretreated with mechanical collectors. The collection efficiency of mechanical collectors can also be increased by hopper evacuation, i.e., the application of a slight negative pressure to the hopper followed by the withdrawal of about 10% of the total flow for separate higher efficiency cleaning. Electrostatic precipitation can be used for efficient particle collection (e.g., fly ash) only when the particle resistivity varies between 10 to the 8 and 10 to the 10 ohm/cm. The first installation of a fabric filter on a coal fired boiler appears to be performing satisfactorily after some preliminary problems of corrosion that were solved by insulating the unit. Fabric filters are not yet being applied to oil-fired boilers.

49785 **APTIC NO. 71582**

Ullman, Thomas James

IMPROVEMENTS IN OR RELATING TO I.C. ENGINE EXHAUST SYSTEMS FOR VEHICLES. *(Zenith Carburetter Co., Ltd., Middlesex (England) Brit. Pat. 1,361,854. 4p., July 31, 1974. (Appl. July 23, 1971, 4 claims).*

A thermal afterburning system for the reduction on internal combustion engine exhaust emissions is described that achieves improved pollutant conversion by adjusting air supply to the reactor in response to both engine drive shaft speed and the loading on the engine drive shaft. An air supply means delivers air to the exhaust combustion reactor at a mass flow rate proportional to the rotational speed of the engine drive shaft. A shunt conduit in parallel with the main air supply conduit has a flow restricting means and a valve member which are governed by conditions which influence the load on the engine driveshaft.

49786 **APTIC NO. 72210**

Unno, K., T. Ro, K. Maekawa, Y. Furukawa, and Y. Hattori

AN OBSERVATION ON THE REMOVAL OF ATMOSPHERIC SULFUR OXIDES BY AIR FILTER. *(Eafiruta ni yoru taikichu iou sankabutsu no jokyo ni tsuite no ichi kosatsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):593, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 442.)*

The extent of sulfur dioxide removal by dust filter was investigated. Adsorption of SO2 on the dust filter, inner walls of air conditioning equipment, and ducts, can be as high as 30-40% during the summer, when humidity is nearly 60%.

49787 **APTIC NO. 72230**

Unno, K., T. Ro, K. Maekawa, Y. Furukawa, and Y. Hattori

INDOOR AIR PURIFICATION SYSTEMS FOR COUNTERING AIR POLLUTION: WHERE AIR PURIFICATION EQUIPMENT UTILIZES ACTIVATED CARBON. *(Taiki osen ni taisuru shitsunai kuki joka hoho ni tsuite: Kasseitan o mochiita kuki joka sochi no baai). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):591, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 440.)*

A combination of high capacity dust filter and activated carbon filter, with humidifier-heater equipment, was used to remove pollutants. The system has been in operation since August 1973. The capacity for dust and sulfur dioxide removal remained at about 70% at the end of one year. The percentage of nitrogen oxides removed was only 50% initially, began to drop from the second month, and reached zero by the twelfth month. Over 80% of the bacteria were removed at all times.

49788 **APTIC NO. 72122**

Vamos, Endre, Istvan Elek, Karoly Keszthelyi, and Ferenc Tatrai

ABATING SOOT FORMATION IN EVAPORATIVE OIL BURNERS BY ADDITIVES. *(Parologtatos olajegok kormozasanak csokkentese adalekokkal). Text in Hungarian. Energiagazdalkodas, 15(10):464-466, Oct. 1974. 9 refs.*

The effect of the fuel oil additive cyclopentadienyl manganese tricarbonyl (CMT) and other additives on soot formation in evaporative oil burners (as in oil stoves) was studied. The optimum concentration of CMT in the fuel oil was 0.025%. Considerable reduction of the soot formation due to CMT was determined under various conditions, even at increased carbon-to-hydrogen ratios. The soot formation of additive-containing fuel oil was determined essentially by the boiling point rather than by the C/H ratio. The additive was most effective at low air-excess coefficients. Another additive, Bycosin, caused no detectable reduction of the soot formation, while ANDEX-A increased it.

49789 **APTIC NO. 71794**

Vargyai, Jozsef

FORMATION AND UTILIZATION OF FLY ASH. *(Pernyefelek keletkezese es hasznositasa). Text in Hungarian. Energiagazdalkodas, 15(11-12):550-556, 1974.*

General problems of slag and fly ash formation and utilization are discussed. The ever-increasing energy demand, and the comeback of coal as an energy carrier in power plants call for efficient solutions to the problem of slag and fly ash. Slag and fly ash are used for concrete in which they partly replace cement. Other possible uses are the amelioration of acid soils, fireclay manufacture, road construction, and tiles. It is possible to recover metals, such as vanadium, iron, aluminum, and radioactive materials from certain types of fly ash and slag. The utilization of fly ash is essential also with respect to the abatement of entrainment from dumps.

49790 **APTIC NO. 72158**

Vogt, Wilhelm, Hermann Glaser, and Helmut Dyrschka

PROCESS FOR THE OXIDATION OF CARBON MONOXIDE AND HYDROCARBONS. *(Knapsack-Aktiengesellschaft, Knapsack bei Koln (West Germany)) Brit. Pat. 1,366,217. 15p., Sept. 11, 1974. (Appl. Nov. 14, 1972, 19 claims).*

A catalyst for the oxidation of carbon monoxide and hydrocarbons in internal combustion engine exhaust gas is described which overcomes prior art problems relating to temperature sensitivity and does not require the use of costly switch valves as a safeguard against high temperatures. The oxidation is effected at temperatures between 100 and 700 C in contact with a carrier- supported catalyst. The carrier is composed of barium aluminate, and the active ingredients of the catalyst are copper, manganese, and nickel oxides. The catalyst may optionally furtherr contain cobalt oxides.

49791 **APTIC NO. 72087**

Waitzman, Dennis Carl

EXHAUST RECIRCULATION. *(Chrysler Corp., Highland Park, Mich.) U. S. Pat. 3,827,412. 6p., Aug. 1974. 4 refs. (Appl. Sept. 18, 1972, 16 claims).*

An exhaust gas recirculation system for the reduction of nitrogen oxide emissions from internal combustion engine exhaust is described that is uncomplicated by moving parts, thus avoiding problems associated with prior-art recirculation systems. The system also results in preheating and improved mixing of the fuel-air mixture in the inlet header. A recycling duct receives the exhaust gases at a restricted upstream end of the exhaust system and passes in heat exchange relationship through a conventional intake manifold hot spot to facilitate heating of the latter. The hot exhaust gases are discharged at a restricted downstream end of the exhaust system in opposition to the inlet flow of the fuel-air mixture directly below the throttle valve. A second restricted duct that extends within the sidewall of the carburetor inlet induction conduit and bypasses the throttle valve opens into the induction conduit upstream of the throttle valve to receive inlet gases during idle. The second duct discharges into the recycling duct between the latter's upstream and downstream restrictions to inhibit exhaust flow through the recycling duct during engine idle operation. (Author abstract modified)

49792 **APTIC NO. 71985**

Warner, Frederick

THE PROTECTION OF THE ENVIRONMENT. *Loughborough Univ. of Technology (England), Leverhulme Project, Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-21. (Jan. 7-8.)*

The control of air pollution in Great Britain is discussed, with particular emphasis on sulfur dioxide control via dispersion from stacks. Reductions in ambient SO2 levels from 170-110 micrograms/cu m over the period 1960-1070 are attributed to a changeover from coal to fuel oil or natural gas for domestic heating and the installation of tall industrial stacks for more effective dispersion of the pollutant. Smoke levels are also reduced for the period by more 100 micrograms/cu m and presently average about 50 micrograms/cu m. Various types of plume behavior are described in terms of meteorological factors, topographical interactions, stack height, and operating conditions.

49793 **APTIC NO. 71747**

Watanabe, I. and T. Okita

METHODS FOR SELECTIVE REMOVAL OF WATER FROM GASEOUS SAMPLES. *(Gasu shiryo kara no entaku-teki suibun jokyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):201, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 58.)*

Commonly used drying methods for gaseous samples are classified into cooling, adsorption, and chemical methods. Effects of these drying methods on sample gas components and the effect of moisture content in sample on adsorption were investigated by gas chromatography. Using 53 types of compounds as samples, the adsorption isotherm and adsorption rate were obtained. In the case of cooling methods, concentrations in the range of several hundred ppm had no effect on adsorption rate, the amount adsorbed was directly proportional to moisture content, and absorption of some samples by water was observed. In the adsorption method, molecular sieve 3A was used. Decreases in sample concentration resulted in decreases in adsorption rate and the amount adsorbed was inversely proportional to moisture content of 3A. In the chemical method, calcium chloride and soda lime coated with sodium hydroxide were used. The adsorption and desorption rates decreased with decreases in sample concentration and the amount adsorbed increased with the decrease in crystallization water of CaCl2.

49794 **APTIC NO. 72060**

Watanabe, Seiichiro

TECHNIQUE AND INSTALLATION FOR REMOVAL OF MICROPARTICLES SUCH AS AIRBORNE DUST. *(Fuyu jinai nado no biryushi o jokyo suru hoho oyobi sono sochi). Text in Japanese. (Nihon Kogei Kogyo KK (Nihon Polytechnic Industries, Ltd.), Tokyo (Japan)) Japan. Pat. Sho 49-46828. 5p., Dec. 12, 1974. 1 ref. (Appl. July 7, 1970, 2 claims).*

Fine, airborne dust particles, formed in an area with poor ventilation, are precipitated by using electrically charged mist to capture these particles. In tunnels, mine passageways, and factories, where ventilation is essentially nil, the innner wall and the ground are connected to a terminal of a direct current, high-voltage generator installation, and become electrodes for dust collection. The other terminal of the high-voltage generator installation is connected to the tip of the spray nozzle of a sprayer, which is insulated from the high-voltage setup. An electric field is created, and electrically charged mist is emitted from the sprayer. The mist electrifies the fine dust particles which adhere to the inner wall and ground, together with the mist, and are removed thereby. The portable sprayer apparatus consists of a spray nozzle, a freely-moving spray nozzle support, a charged electrode attached to the tip of the spray nozzle, a liquid supply source apparatus for the spray nozzle, a connecting pipe between the spray nozzle and liquid supply, and direct current, high-voltage generator equipment, whose two terminals are connected as described above.

49795 **APTIC NO. 72176**

Watanabe, Tamotsu

TREATMENT OF INTERIOR DUST. *(Shitsunai no funjin shori hoho). Text in Japanese. (Nihon Kogei Kogyo Co., Ltd. (Nihon Polytechnic Industries), Tokyo (Japan)) Japan. Pat. Sho 49-46829. 3p., Dec. 12, 1974. (Appl. Oct. 13, 1970, 1 claim).*

An improved dust collection method for enclosed areas (factories, tunnels, etc.) by use of a direct current, high-voltage generator is described. The ground electrode terminal for the generator is connected to the wall enclosing the area, so that a portion of the wall becomes a stationary dust collecting electrode. The other terminal of the generator is connected to a network of rope-type electrodes, suspended from the ceiling, but insulated from it by the supports. The core of the rope-type electrode can be made of synthetic resin fibers (nylon, polyester, polyethylene, polypropylene, vinyl chloride) or film type of tape yarn. A conducting sheath (conductive rubber containing carbon black), formed with at least one angular edge (cross-sectional shape can be triangle, square, rhombus, or vertical section of an ice-cream cone), is placed around the core. High voltage passing between the two terminals causes the dust between the poles to settle on the wall. There is no increase in residual charge in the rope electrode, because of gradual electrical discharge, and consequently, no danger of shock to approaching personnel. Rope electrodes also impart portability and flexibility to the movable electrode.

49796 **APTIC NO. 71843**

Weaving, John Harold and Cecil David Haynes

EXHAUST SYSTEMS FOR INTERNAL COMBUSTION ENGINES. *(British Leyland Motor Corp., Ltd., London (England)) Brit. Pat. 1,362,202. 4p., July 31, 1974. (Appl. Jan. 19, 1971, 10 claims).*

A catalytic afterburning system for the minimization of carbon monoxide and nitric oxide in internal combustion engine exhaust is described. A duct defines at least two parallel paths for exhaust gases from the engine, and a flow proportioning device is used to regulate the exhaust gas flowing along each path relative to the total exhaust. A catalytic reactor is disposed in one of the paths. A combining means is located downstream of the catalytic reactor to merge the exhaust gas output of the reactor and the exhaust gas output of the other ducted path. A second catalytic reactor is situated to receive the combined streams.

49797 **APTIC NO. 71870**

Weaving, John Harold and Cecil David Haynes

IMPROVEMENTS RELATING TO EXHAUST SYSTEMS FOR INTERNAL COMBUSTION ENGINES. *(British Leyland Motor Corp., Ltd., London (England)) Brit. Pat. 1,359,660. 4p., July 10, 1974. (Appl. Dec. 18, 1970, 9 claims).*

A method for the catalytic conversion of hydrocarbons, carbon monoxide, and nitrogen oxides in exhaust gases from internal combustion engines is described that allows for the operation of the catalysts over their specified temperature range. The method involves first cooling the relatively hot exhaust gases by heat exchange with relatively cool air. The cooled gases are then passed into a first catalytic reactor to enable at least one component of the gases to be reduced. The gases issuing from the first catalytic reactor are then mixed with the air that received heat from the exhaust and passed into a second catalytic reactor for the oxidation of at least one component of the exhaust gas. The heat removing means comprises a gast-to gas heat exchanger incorporated in a duct to permit a flow of coolant to be passed in heat exchange contact, but separate from, the flow of exhaust gases in the duct. The heat restoring means comprises in inlet incorporated in the duct downstream of the first catalytic reactor such that the coolant heated by passage through the heat exchanger can be fed into the exhaust gases flowing along the duct from the first reactor.

49798 **APTIC NO. 71912**

Welstand, J. S. and C. H. Oki

THE ECONOMIC EFFECTIVENESS OF VEHICLE INSPECTION AND MAINTENANCE FOR REDUCING EXHAUST EMISSIONS: A SUPPORTING EXPERIMENTAL PROGRAM. *Preprint, Society of Automotive Engineers, New York, 16p., 1974. 6 refs. (Presented at the Society of Automotive Engineers Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974, Paper 740132.)*

A series of experimental programs to determine the economic effectiveness of vehicle inspection and maintenance in reducing exhaust emissions was conducted with emission-controlled and non-emission-controlled vehicles. Changes in exhaust emissions due to engine settings were generally consistent for all power train configurations, and proper selection of engine adjustments produced measurable decreases in exhaust emissions. Exhaust emissions of hydrocarbons and carbon monoxide exhibited significant deterioration with mileage. The most pronounced deterioration was that associated with the air cleaner for all vehicle categories and failure of heat riser valves in pre-1971 vehicles. Moderate failures of nitrogen oxide vacuum advance control devices and choke vacuum diaphragms in older vehicles were exhibited with increasing mileage and time. Regarding the ability of service stations, dealerships, and independents to detect and repair malfunctions, the worst performance was exhibited with unfamiliar component faults such as NOx-control devices and choke vacuum kick. The ability to set idle CO and to repair NOx control and spark plug misfire was highest for dealer service organizations, next highest for independent garages, and lowest for service stations. Depending on the type of malfunction and the service organization, the detection ratio ranged from 12-100%, whereas the repair ratio ranged from 0-100%.

49799 **APTIC NO. 72296**

Went, J. J.

FUTURE S ENERGY. *(A jovo energiaja). Text in Hungarian. Energia Atomtech. (Budapest), 27(12):537-541, Dec. 1974. (Presented at the 16th UNIPEDE Conference, The Hague.)*

The prospects of conventional energy carriers, and the chances for new sources of energy are described. The combustion of fossil energy carriers causes changes in the atmosphere whose consequences can not yet be predicted with certainty. This, and the foreseeable depletion of fossil energy carriers will cause a need for unconventional energy sources, and especially for nuclear energy to satisfy future energy needs. The development of breeder reactors will make it possible to utilize materials with very low uranium contents, such as sea water, which means that nuclear reactors will be able to satisfy all energy needs. Hydrogen, which generates harmful nitrogen oxides during its combustion only at very high temperatures, is proposed as a transportable energy carrier that can be generated in nuclear power plants, or by the exploitation of the reserve capacity of power plants.

49800 **APTIC NO. 71666**

Wertheimer, Harry P.

EXHAUST GAS RECIRCULATION FLOW CONTROL SYSTEM. *(The Bendix Corp., Southfield, Mich.) U. S. Pat. 3,814,070. 10p., June 4, 1974. 8 refs. (Appl. Dec. 26, 1972, 21 claims).*

A closed-loop exhaust gas recirculation flow control system for minimizing nitrogen oxide emissions from internal combustion engines is described that, unlike prior-art devices, compensates for changes in sensed engine variables by incorporating feedback from the exhaust gas recirculation system. A valve that is responsive to engine air flow and to recirculated exhaust gas flow provides a scheduled flow control signal to the exhaust gas recirculation valve. Thus, recirculating to the engine's intake manifold begins smoothly and holds at a relatively constant or scheduled fraction of the engine air flow for maximum effectiveness and minimum loss in vehicle driveability. If the exhaust gas recirculation flow tends to become too high or too low, a force unbalance created within the valve closes or opens the exhaust gas recirculation valve an amount necessary to change the exhaust recirculation in relationship to engine air flow. Recirculation is completely installed when engine air flow increases to a point where a force unbalance is again created. (Author abstract modified)

49801 **APTIC NO. 71602**

Westerlund, K. E.

CONTRIBUTION TO CLEANER AIR AND WATER. *(Bidrag till renare luft och vatten). Text in Swedish. Forum, no. 19:26-27, 1974.*

Problems of industrial air and water pollution in Finland are outlined with regard to the removal and recovery of sulfur dioxide from flue gases from industrial and power plant flue gases. Sulfur dioxide, generated in large quantities by thermal power plants and sulfuric acid production plants, is absorbed in sodium sulfite solution in the Wellman-Lord process on the basis of the sodium sulfite-disulfite cycle. Sodium sulfite is regenerated, while the residual SO2 released during regeneration is recirculated within Claus equipment or in separate sulfuric acid production facilities.

49802 **APTIC NO. 71763**

Yagi, Shizuo and Toru Hatanaka

COMBUSTION CHAMBER APPARATUS FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan no nenshoshitsu sochi). Text in Japanese. (Honda Giken Ind. Co., Ltd., Tokyo (Japan)) Japan Model Util. Sho 49-46323. 2p., Dec. 18, 1974. (Appl. June 16, 1971).*

A device for a supporting combustion chamber in internal combustion engines is described. A small hole connects the supporting and main chambers, and the flame ignited at the supporting chamber induces the combustion at the main chamber. The spark plug in the supporting chamber is covered with a circinate metal plate with high heat conductivity. This divides the supporting chamber into two sections; igniting chamber and sourrounding chamber. The fuel stream jetted spreads into the igniting chamber into a motion of eddy current and the spread fuel is evaporated quickly by a large surface of hot circinate plate. Therefore, misfiring at the supporting chamber during cold engine operation is prevented.

49803 **APTIC NO. 72255**

Yamada, T.

AIR CLEANER. *(Kuki seijoki). Text in Japanese. (Kyowa Kigyo Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 49-45025. 2p., Dec. 9, 1974. (Appl. June 1, 1971).*

A compact air cleaner for room air of factories is described. Size reduction with respect to conventional air cleaners is achieved by installing a device to generate an inverted air flow which removes large particles; therefore a large surface area of filtering material is not necessary. Two cylindrical tubes are used to generate the inverted flow. Air is sucked through the first tube and hits the bottom of the cleaner and then flows into the filter chamber through a second tube which surrounds the first tube. Filter materials, such as glass fiber, is held by a filter holder and can be cleaned.

49804 **APTIC NO. 71856**

Yavorsky, Paul M., Sayeed Akhtar, and Sam Friedman

PROCESS DEVELOPMENTS: FIXED-BED CATALYSIS OF COAL TO FUEL OIL. *AICHE Symp. Ser., 70(137):101-105, 1974. 2 refs.*

Process developments in coal liquefaction and fuel oil hydrodesulfurization are reviewed. Coal conveyed in recycle oil is propelled by rapid turbulent flow of hydrogen through a reactor packed with immobilized (fixed bed) catalyst pellets. A relatively low-value, high-sulfur Kentucky strip coal having 4.6% sulfur and 17% ash was continuously converted in a small pilot plant into high-value fuel oil having only 0.19% sulfur and 1% ash. This oil more than satisfies air quality standards for sulfur in fuels for electric power plants. Two recently demonstrated process improvements that reduce process cost are a four-fold reduction in gas flow through the reactor and a 50% increase in coal throughput synthetic oil production. The feasiblility of recycling unconsumed hydrogen is also demonstrated. Presulfidation of the catalyst (silica-promoted cobalt molybdate) appears to be of no benefit based on studies showing that the product from presulfided catalysts contain more sulfur and organic benzene insolubles than the product from nonpresulfided catalysts. Studies on the effect of hydrogen sulfide contamination of recycled gas indicate that hydrogen sulfide should be removed from the recycled gas for maximum removal from the product.

49805 **APTIC NO. 67965**

Yeager, Kurt E.

THE IMPACT OF ENERGY SELF-SUFFICIENCY ON POLLUTION CONTROL. *Environmental Protection Agency, Cincinnati, Ohio, National Environmental*

Research Center and Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Pollut. Control Technol. Assess., Proc. Environ. Resour. Conf., Columbus, Ohio, 1974, p. 130-147. (May 1-3, Paper EPA-670/9-74-006.)

The impact of energy self-sufficiency on pollution control is considered in terms of major environmental problems in the achievement of such self-sufficiency and the corresponding federal environmental research objectives designed to solve these problems. The fundamental goals of the federal energy-related research program are: improvement in the understanding of the environmental impact of energy self-sufficiency; determination of the relationships between source control and impact reduction in social, economic, and environmental terms; and the translation of these research efforts in a manner which permits the public and its representatives to make policy decisions based on knowledge of the total costs and benefits of various approaches to energy self-sufficiency. Research efforts are summarized for such activities as the use of high temperature gas turbines with low BTU coal gasification for improved thermal efficiency in electrical generation, the use of solid wastes as fuels, magnetohydrodynamics, fuel cells, coal and oil shale mining, direct combustion, coal liquefaction and gasification, fluidized bed coal combustion, nuclear energy production, solar energy uses, and geothermal systems.

49806 **APTIC NO. 72036**

Yokoi, Masao

A REPORT OF THE AMMONIA GYPSUM PROCESS BY MEANS OF EXHAUST GAS DESULFURIZERS. *(Ammonia sekko-ho haien datsuryu sochi ni yoru shiken kenkyu hokoku). Text in Japanese. Ryusan to Kogyo (Sulfuric Acid Ind.), 27(10):176-183, Oct. 1974.*

In the process reported here unnecessary ammonia in coke furnace gas is utilized as an absorbent. The ammonia reacts with sulfurous acid in exhaust gas and ammonium sulfate is recovered. In a multiple-plate absorption method, a high desulfurization rate can be obtained by controlling the pH of the absorbing solution. When ammonia is used as the absorbent, the temperature and concentration must be minimized to achieve a high desulfurization rate.

49807 **APTIC NO. 75290**

Zalogin, N. G., V. M. Tkachenko, Y. S. Milovidov, and L. P. Yanovskiy

STUDY OF ELECTROSTATIC PRECIPITATORS IN POWER PLANTS BURNING BALTIC OIL-SHALE. *(Issledovaniye elektrofil trov na elektrostantisii, szhigayushchey pribaltivskiy slanets). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-11, Sept. 1974. 5 refs. Translated from Russian, 11p. (Also: Elektr. St. (Moscow), no. 1:11-13, 1973.) (Entire report of TR 104-75 processed under APTIC 70040.)*

Modifications for improving the collection efficiency and operational reliability of electrostatic precipitators used for the removal of fly ash at power plants burning oil shale are described along with field test results. The modifications include: the replacement of bar cross-section corona discharge electrodes with needle electrodes, the installation of automated power supply sets, and the use of a new precipitating electrode vibrating schedule. Field test measurements of the dust content in the treated gas stream following modification of a precipitator revealed dust collections that were about double their prior value. The operation of the needle corona discharge electrodes was considerably more stable than for the bar type electrodes. Equal periods between the vibrating of individual electrodes located above a common bunker also increase efficiency.

49808 **APTIC NO. 75291**

Zalogin, N. G., Y. S. Milovidov, V. K. Pis mennyy, V. M. Tkachenko, and L. P. Yanovskiy

APPLICATION OF DGPNI-55-3 ELECTROSTATIC PRECIPITATORS FOR CLEANING OIL SHALE ASH FROM FLUE GASES. *(Vnedreniye elektrofil trov DGPNI-55-3 dyla ochistki dymovykh gazov ot slantsevoy zoly). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology. U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-7, Sept. 1974. 5 refs. Translated from Russian, 7p. (Also: Elektr. st. (Moscow), no. 6:35-37, 1973.) (Entire report of TR 104-75 processed under APTIC 70040.)*

Modifications for improving the collection efficiency and operational reliability of electrostatic precipitators used for removing stack gas fly ash from oil shale power plant operations are described. The modifications include the following: replacement of bar cross section corona discharge electrodes with electrodes of increased emission capabilities (band-needle type); installation of variable-ratio transformers for the vibrating mechanism shaft speed; and replacement of mechanical rectifiers in the power supply with semiconductor-type rectifiers. An efficiency of 97.45% during field tests was obtained following the above changes.

49809 **APTIC NO. 72302**

Zenkner, Kurt

DEVICE FOR THERMAL AFTERBURNING OF EXHAUST AIR. *(Assignee not given.) U. S. Pat. 3,827,861. 9p., Aug. 6, 1974. 5 refs. (Appl. May 29, 1970, 8 claims).*

A system for the thermal afterburning of stack gases and particulates is described that utilizes the principle of heat exchange to allow for minimum energy consumption. The exhaust gases are passed through a series of heat exchangers and then to a burner supplied with air. The resultant high combustion gases are then led back outside the burning zone in a direction opposite to the original flow and through the heat exchangers in heat exchange relation with the incoming exhaust air. A portion of the combustion gas is again sucked into the combustion center after the original combustion process to achieve total combustion of the components accompanying the exhaust air.

49810 **APTIC NO. 69229**

Council for Industrial Systems (Japan) and Sub-Committee for Automobile Pollution Countermeasures (Japan)

NO-LEAD TREATMENT OF AUTOMOBILE GASOLINE. *(Jidosha gasorin no muenka taisaku ni tsuite). Kankyo Hoken Reporto (Environ. Health Rept.), no. 30:31-42, July 1974.*

When a no-lead gasoline is used under given conditions, valve seat recession is caused and a number of problems occur subsequently, including an increase of exhaust gases. To allow the use of unleaded gasoline, restructuring of the engine and cleaning device for emission gases are necessary. To meet the 1975 target emission standard which is extremely stringent, the technical improvement in the engine structure alone will not be enough. The newly developed emission gas purification device must have superior endurance, no material limitations, economic advantages, and no new pollution. On the other hand, the improvement of gasoline without lead will require much more examination. For the moment, unleaded gasoline will be sold as of April 1974 (report dated March 1974); the unleaded gasoline octane value should be more than 88 of regular gas, and more than 95 of premium gas. For maintaining high octane but using no lead additives, the total gasoline quality will have to be improved, a decompositon device developed, and alkylation added. Aromatic and olefin hydrocarbons must be controlled as much as possible in the composition of gasoline. The valve seat recession shortens engine life and increases carbon monoxide and hydrocarbons in the emission gases. Some method of counteraction must be developed within this year. The 1973 experiments by the Committee on Automotive fuel studies showed that with an increase in the driving speed and decrease of engine exhaust gas emission, the valve seat recession was caused faster; and for trucks, the greater the load, the faster progress of valve seat recession. A phosphorus compound preventive for valve seat recession has been found but this requires more research against possible new pollution.

49811 **APTIC NO. 69540**

Dept. of the Interior, Washington, D. C., Office of Coal Research

COAL TECHNOLOGY: KEY TO CLEAN ENERGY (ANNUAL REPORT). *156p., 1974. 138 refs.*
GPO

Office of Coal Research-sponsored research activities concerning coal gasification, solvent-refining of coal, coal-to- liquid conversion, the development of power generation systems with inherent pollution control, and mining reclamation studies are presented in an annual report. Projects involving the production of high-Btu and low-Btu gas include attempts to use caking types of coals for the Lurgi process, pilot plant programs to demonstrate the large-scale conversion of coal to substitute natural gas, carbon dioxide acceptor processes for gasification of lignite only, low-Btu processes in which CO2 and methanation are eliminated, and combined cycle operations. A Coal-Oil-Energy-Development process, involving the pyrolysis of high-volatile bituminous coal in a multistage fluidized-bed reactor, is being studied for the possible production of high grade synthetic crude oil, pipeline-quality gas, and char. Power generation systems utilizing fluidized-bed combustor-gas turbine arrangements are being designed for inherent pollution control in coal burning processes. Research is also underway to utilize magnetohydrodynamics for the generation of electricity by forcing gases from coal fired at relatively high pressure through a magnetic field to produce an electric current.

49812 **APTIC NO. 71550**

Air Pollution Systems, Inc., Seattle, Wash.

APS ELECTROSTATIC SCRUBBER FINE PARTICLE DUST COLLECTION SYSTEM. PRELIMINARY REPORT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1974. 8 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 17-19, 1974.)*

A pilot 5000 ACFM electrostatic scrubber is described in terms of its design and performance characteristics. The apparatus consists of an ionizer probe supported in the inlet of a low energy venturi scrubber. A stable electrical discharge of high intensity is maintained across the venturi throat between the center electrode and the wall. The average field that can be maintained across the electrode gap is substantially higher than that of a standard electrostatic precipitator (18 KV/cm versus 4 KV/cm). The ultra high field imposed a high degree of electrostatic charge on particles that pass through it, despite a low residence time of less than 10 milliseconds. Overall collection efficiencies of 99.1% are illustrated for cement dust resuspended in a laboratory system. Pilot tests on a sulfate pulp mill recovery boiler result in collection efficiency improvements equivalent to an 8-15 w.g. pressure drop saving. The lower pressure drop and lower total energy consumption of the electrstatic scrubber reslut in reductions in operating costs.

49813 **APTIC NO. 71560**

American Petroleum Inst., Washington, D. C., Div. of Refining

FILTERS AND WET COLLECTORS FOR THE REMOVAL OF PARTICULATE MATTER. *In: Manual on Disposal of Refinery Wastes. Volume on Atmospheric Emissions. Washington, D. C., American Petroleum Institute, 1974, Chapt. 13, p. 1-28. 13 refs.*

Theoretical mechanisms and practical applications of various particulate removal devices are reviewed. Types of devices considered include: cyclones, wet scrubbers, fabric collectors, electrostatic precipitators, settling chambers, and inertial separators. Dust collection characteristics of these devices are compared in terms of collection efficiency, the effect of dust and gas stream variations, collector space, pressure drop, and the effect of reduced volume on collection efficiency. Comparative cost data are also given in terms of installation and operation, including power consumption requirements.

49814 **APTIC NO. 71561**

Environmental Protection Agency, Ann Arbor, Mich., Technology Assessment and Evaluation Branch

EVALUATION OF THE SPECIAL FORMULA CENTRIFUGAL ADVANCE SPRINGS. *Preprint, 8p., Dec. 1974. 1 ref.*

Exhaust emission and fuel economy tests (1972 Federal Test Procedure) were performed on a 1974 Chevelle Malibu Classic (350 cu in. V-8 engine) equipped with a set of Special Formula Company springs replacing the standard centrifugal advance springs in the ignition distributor. Replacement of the standard springs with the Special Formula springs resulted in 13, 12, and 32% increases in emissions of hydrocarbons, carbon monoxide, and nitrogen oxides, respectively. Fuel economy was only slightly improved from 13.8 mi/gal to 14.1 mi/gal.

49815 **APTIC NO. 71572**

(Inventor not given.)

APPARATUS FOR SEPARATING PARTICULATE MATERIAL. *(Wedag Westfalia Dinnendahl Groppel Aktiengesellschaft, Bochum (West Germany)) Brit. Pat. 1,361,815. 3p., July 31, 1974. (Appl. Dec. 17, 1971, 6 claims).*

A particulate separator equipped with water jackets for cooling rejects and/or fines is described that precludes the need for large volumes of cooling air associated with prior-art devices of similar nature. The apparatus includes a separating chamber, a means for introducing the material to be sorted and a separating fluid (e.g., air), at least one extracting chamber, and a collecting chamber below the separating chamber. The collecting chamber is lined on the inside and the outside with cooling means (water jackets) such that the material remaining after precipitation passes between them.

49816 **APTIC NO. 71574**

(Inventor not given.)

CONDENSATION OF STEAM TURBINE EXHAUSTS. *(Sasakura Engineering Co., Ltd., Osaka (Japan)) Brit. Pat. 1,361,825. 4p., July 31, 1974. (Appl. June 30, 1971, 3 claims).*

A method for condensing power plant turbine exhaust steam is described that overcomes prior-art disadvantages of thermal water pollution, cooling system corrosion problems, and insufficient steam space vacuum in the condenser. Turbine exhaust steam is mixed with cooling water in a direct contact condenser maintained under a vacuum, with the temperature of the water in the condenser being less than the boiling temperature under the vacuum conditions in the condenser. The mixture of cooling water and condensed turbine exhaust thus formed is withdrawn and divided into two parts. One part is returned to a boiler (partly fired by gas) suitable for generating steam to drive the turbine; while the other part is returned to the condenser for use as cooling water after it has been passed through an air cooled heat exchanger. The water to be used for cooling is placed in heat exchange with liquid gaseous fuel such that the latter is vaporized at the expense of the heat lost from the water.

49817 APTIC NO. 71576

(Inventor not given.)

AN EXHAUST GAS PURIFYING DEVICE FOR AN INTERNAL COMBUSTION ENGINE. *(Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Brit. Pat. 1,364,090. 9p., Aug. 21, 1974. (Appl. Dec. 30, 1971, 10 claims).*

A system for reducing hydrocarbon, carbon monoxide, and nitrogen oxide emissions from an internal combustion engine during warm-up is described. The system, which is used in conjunction with an exhaust gas reactor (thermal and/or catalytic), consists of a means for detecting warm-up of the engine and/or reactor as well as an engine speed control for maintaining the engine speed above 2500 rpm until the engine and/or reactor have reached a predetermined temperature as sensed by a thermodetector. Provision may also be made for stopping the cooling fan during warm-up.

49818 APTIC NO. 71577

(Inventor not given.)

ELECTROSTATIC DUST COLLECTOR FOR EXHAUST GASSES CONTAINING FINE PARTICLES. *(Nippon Kogei Kogyo Co. Ltd., Tokyo (Japan)) Brit. Pat. 1,364,029. 10p., Aug. 21, 1974. (Appl. Oct. 11, 1972, 8 claims).*

An electrostatic dust collector for removing fine particles from exhaust gases is described that, unlike prior-art designs, is capable of removing particles with diameters of less than 1 micron as well as particles with high electrical resistance. An electrode within the exhaust gas passage of the device is maintained at a high electrical potential, while a dust collecting electrode which faces the high voltage electrode is maintained at earth potential, thus establishing an electrostatic field and dust collecting zone. A discontinuous particle aggregating electrode situated transverse to the intended gas flow and located near the high voltage electrode is maintained at earth potential to establish a field sufficient for promoting particle aggregating but not sufficient for causing substantial particle deposition on the particle aggregating electrode. A humidifying means is preferably provided upstream of the particle aggregating electrode when the particles have a high specific electrical resistance.

49819 APTIC NO. 71578

(Inventor not given.)

DAMPER-ROD SCRUBBER. *(Combustion Engineering, Inc., Windsor, Conn.) Brit. Pat. 1,362,620. 5p., Aug. 7, 1974. (Appl. July 19, 1972, 5 claims).*

A damper-rod type scrubber for cleaning stack gases resulting from fuel combustion operations is described that provides for the effective removal of the scrubbing action and resulting pressure drop during periods when clean fuels such as natural gas are being used. Several parallel, spaced rods extending transversely across the scrubbing passage are located downstream of the spraying means. Provision is made for rotating the rods 90 deg such that they are parallel to the longitudinal axis of the scrubbing passage, thus effectively removing the rods from the gas passage with respect to cleaning and restricting the flow path.

49820 APTIC NO. 71586

(Inventor not given.)

A SYSTEM FOR THE POST-COMBUSTION OF THE UNBURNT SUBSTANCES IN THE EXHAUST GASES OF AN INTERNAL COMBUSTION ENGINE. *(Alfa Romeo S.p.A., Milan (Italy)) Brit. Pat. 1,361,261. 8p., July 24, 1974, (Appl. Sept. 6, 1971, 15 claims).*

An exhaust afterburning system for the reduction of unburnt pollutants from internal combustion engines is described which eliminates prior-art problems associated with heat deterioration of the valve controlling the exhaust flow to the afterburner. The system consists of amin exhaust duct with a silencer in its length and a supplementary exhaust duct. The upstream end of the latter opens from the main exhaust dust at a location upstream of the main silencer; the downstream end opens to the atmosphere, either directly or through a portion of the main duct downstream of the main silencer. The post-combustion chamber is situated in the length of the supplementary duct. An exhaust flow valve is located in the main duct downstream of the main silencer but upstream of any connection of the downstream end of the supplementary duct. A control means is provided to open and close the exhaust flow valve in response to the exhaust gas temperature.

49821 APTIC NO. 71587

(Inventor not given.)

DEVICE FOR FILTERING GASES. *(Luwa AG., Zurich (Switzerland)) Brit. Pat. 1,361,447. 5p., July 24, 1974. (Appl. Sept. 3, 1971, 11 claims).*

A device for filtering gases through a folded web of filter material is described that overcomes problems involving the breakdown of filter-housing adhesion associated with bonded filters operating at temperatures above 250 C. The apparatus consists of a housing having a pair of opposed openings and a rectangular hollow cross-section. A folded filtering web extends the length and width of the openings, with the depth of the web folds being smaller than the distance between the opposed openings. The lateral edges of the folds are connected to the side walls of the housing by a sealing compound. A pretensioned means for resiliently urging opposed ends of the wet into engagement with the housing is proved, along with a means for spacing the folds of the web and engaging at least the fold-edges of the web.

49822 APTIC NO. 71588

(Inventor not given.)

SCRUBBING OF GASES CONTAINING TICl4. *(Du Pont De Nemours (E. I.) and Co., Wilmington, Del.) Brit. Pat. 1,361,519. 7p., July 24, 1974. (Appl. July 14, 1972, 5 claims).*

A method for scrubbing tail gases from the manufacture of titanium oxide that contain mists of titanium chloride and hydrochloric acid is described. An anhydrous gas stream containing the impurities is contacted with an initial quantity of an aqueous liquid to evaporate into the gas stream an amount of water, insufficient to saturate the gas stream under prevailing temperature and pressure conditions but greater than that stoichiometrically required to react with the titanium chloride to form titanium oxide. At least 0.05 sec after the initial contact, the gas stream is contacted with additional aqueous liquid in an amount at least sufficient to saturate the gas stream with water and scrub hydrogen chloride from the gas stream.

49823 APTIC NO. 71777

PRESENT DEVELOPMENT IN NOX CONTROL TECHNOLOGY BY COMPANIES, PART 1. *(NOx boshi gijutsu no mekabetsu kaihatsu jokyo). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(12):39-41, Dec. 1974.*

Nitrogen oxides emission from stationary and mobile sources can be controlled chemically or physically by such methods as use of air rich fuel, two-staged combustion, recirculation of exhaust gas, structural improvement of burner, addition of combustion supporting gas, and the use of lower nitrogen containing fuel. A recent study showed that the construction cost of a denitrification plant was comparable to that of a desulfurization plant. Up to 50% reduction of NOx formation could be achieved by physical techniques also. The burners of five different companies, are compared and all of them have a unique physical improvement for fuel combustion.

49824 ***APTIC NO. 71823***

PRESENT STATUS OF TECHNICAL DEVELOPMENT FOR NOX EMISSION CONTROL. (NOx haishotsu boshi gijutso kaihatsu no genjo). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(12):46, Dec. 1974.

A survey was conducted by the Bureau of Air Pollution on nitrogen oxides prevention techniques. From 20-40% NOx reduction was achieved by two-stage combustion or exhaust recirculation when applied to large-scale boilers. From 25-40% NOx reduction was achieved by small low-NOx burners as compared to conventional burners. It is possible to achieve 50% or more reduction when low N-content fuel is used along with two-stage combustion or low-NOx burners. Remarkable progress has been made in selective catalytic reduction of the dry flue gas denitration process type using ammonia as reducing agent successful simultaneous wet-type flue gas desulfurization and denitration has been achieved at pilot plant scale.

49825 **APTIC NO. 71841**

(Inventor not given.)

POLLUTANT COLLECTION BY IRRADIATION. *(Environmental Master Systems, Inc., Canfield, Ohio) Brit. Pat. 1,360,402. 9p., July 17, 1974. (Appl. Oct. 26, 1971, 21 claims).*

An irradiation method for the collection of particulate and gaseous pollutants (e.g., sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, hydrogen fluoride, and hydrogen chloride) from coal-burning and various industrial processes is described that achieves such collection without the undue cost or complexity of prior-art methods. The pollutants are ionized with isotopic irradiation, thereby inducing conglomeration for subsequent collection. The apparatus for removing the pollutants includes a passageway with an inlet and outlet, a means to convey the effluent gases into the passageway inlet, an irradiation zone containing a high energy, high intensity isotope source (cobalt 60) positioned between the ends of the passageway, and a collecting means joined to the outlet passageway outlet to receive the irradiated pollutants. The isotope source is capable of creating a radiation field at energy levels of at least one million electron volts and exposing the pollutants to dosage levels of at least one kilorad.

49826 **APTIC NO. 71842**

(Inventor not given.)

METHOD OF REMOVING COMBUSTIBLE VAPOROUS OR GASEOUS IMPURITIES FROM AN AIR OR GAS STREAM. *(Ceag Concordia Elektrizitaets Aktiengesellschaft, Postfach (West Germany)) Brit. Pat. 1,362,248. 5p., July 31, 1974. (Appl. June 17, 1971, 10 claims).*

A method for the adsorptive removal of combustible impurities from gas streams is described that is simpler, more economical, and less susceptible to adsorbent deactivation than prior-art methods. The impurity-laden gas stream is passed through an adsorption filter until some determined filter loading is achieved. The gas stream is then disconnected from the adsorbent filter. A hot inert gas stream is produced by the stoichiometric combustion of one or more hydrocarbons and is passed through the filter in a direction countercurrent to the gas stream flow to remove the impurities in the filter. The impurities entrained in the inert gas stream are then burnt in air or oxygen.

49827 **APTIC NO. 71844**

(Inventor not given.)

REMOVING SULPHUR OXIDES FROM EXHAUST GAS. *(Bergwerksverband GmbH, Essen (West Germany)) Brit. Pat. 1,362,496. 5p., Aug. 7, 1974. (Appl. Aug. 17, 1972, 13 claims).*

A process for removing sulfur oxides from furnace exhaust gases is described that allows for increased loading of the carbon- containing absorbent material employed, thus reducing the amount of absorbent required for a given removal capability. The exhaust gas is passed through a reactor provided with a bed of granular carbon-containing material which moves from the top to the bottom of the reactor. The exhaust is passed through the moving bed perpendicular to the direction of motion of the bed. That portion of the exhaust gas passing through the upper part of the bed is withdrawn as substantially desulfurized gas, while the remaining portion of the gas is subjected to a further desulfurization treatment.

49828 **APTIC NO. 71845**

(Inventor not given.)

PROCESS AND APPARATUS FOR PURIFYING A GAS. *(Bronswerk- Apparatenbouw N.V. v/h Moring and Steenart, Nijkerk (Holland)) Brit. Pat. 1,362,621. 6p., Aug. 7, 1974. (Appl. July 25, 1972, 11 claims).*

A wet scrubbing process for purifying gas streams is described that achieves increased removal efficiency via a pre-atomization section. The scrubbing liquid (e.g., water) is first converted to a liquid mist by means of a rotary atomizer. The gas to be purified is then mixed with the liquid mist so that at least some of the impurities in the gas are transferred to the mist. The liquid mist is then mixed with a second liquid adapted to absorb the impurity-laden mist. The purified gas is then separated from the second scrubbing liquid. The second scrubbing liquid is sprayed in a coarse drop pattern.

49829 **APTIC NO. 71863**

(Inventor not given.)

PURIFICATION OF GASES. *(Steuler-Industriewerke G.m.b.H., Postfach (West Germany)) Brit. Pat. 1,359,421. 5p., July 10, 1974. (Appl. Aug. 29, 1972, 12 claims).*

A low-cost means for removing odorous particulate matter from rendering plant waste gases and the like is described. A mixture of the off gas and chlorine is passed upwardly through an absorption tower containing several capillary washing plates. The gas contacts a washing liquid consisting of 2-6 wt% sodium or potassium hydroxide solution in a first washing stage and then a 3-8 wt% solution of sodium or potassium hydroxide in a second washing stage. The gas in finally washed with 0.5-8 wt% sulfaminic acid solution in a third washing stage.

49830 **APTIC NO. 71866**

(Inventor not given.)

PROCESS AND APPARATUS FOR REMOVING POLLUTANTS FROM GAS STREAMS. *(Carrier Corp., Syracuse, N. Y.) Brit. Pat. 1,360,047. 14p., July 17, 1974. (Appl. Sept. 2, 1971, 24 claims).*

A continuous process for the removal of oxidizable pollutants (e.g., sulfur dioxide, hydrocarbons, carbon monoxide, and odorants) from gas streams is described that allows for regeneration of the oxidant and does not result in the production of objectionable oxidation products as with prior-art techniques. The process involves contacting the gas stream in mass transfer relationship with an aqueous acid stream containing at least one electrolytically regenerable ionic oxidizing agent (cobalt, chromium, manganese, cerium, or silver) in ionic form to transfer oxidizable impurities from the gas stream to the aqueous acid stream. The ionic oxidizing agent is then electrolytically regenerated to a higher valence state to restore its capacity for destroying oxidizable pollutants.

49831 **APTIC NO. 71867**

(Inventor not given.)

EXHAUST GAS RECIRCULATION SYSTEM FOR AN INTERNAL COMBUSTION ENGINE. *(Nissan Motor Co., Ltd., Yokohama (Japan)) Brit. Pat. 1,360,177. 8p., July 17, 1974. (Appl. Dec. 19, 1972, 8 claims).*

An exhaust gas recirculation system for the reduction of nitrogen oxide emissions from internal combustion engines is described that, unlike prior-art recirculation systems, is responsive to the intake manifold vacuum. The system includes; an intake manifold, an exhaust manifold, a secondary air supply device having a pneumatic pump driven by the engine, and air gallery communicating with the pneumatic pump, at least one secondary air injection nozzle communicating with the air gallery and opening into the exhaust manifold, a conduit means extending between the exhaust manifold and the intake manifold, a valve interposed in the conduit to control the amount of exhaust recirculation, a valve actuating means having a movable member connected to the valve head to control the movements thereof, a control chamber communicating with the air gallery to receive secondary air therefrom, and a means for controlling the pressure of the secondary air in the control chamber of the valve actuating means in response to variations in intake manifold vacuum.

49832 **APTIC NO. 71924**

Office of Air and Waste Management, Ann Arbor, Mich., Technology Assessment and Evaluation Branch

EVALUATION OF A TURBOCHARGED TCCS POWERED PLYMOUTH CRICKET. *Preprint, 18p., Oct. 1974.*

Exhaust emission and fuel economy tests (1975 Federal Test Procedure) were performed on a 1972 Plymouth Cricket equipped with a turbocharged four-cylinder stratified charge engine (Texaco Controlled Combustion System) and an exhaust catalyst. The tests were conducted for three different fuels: unleaded gasoline, number 2 diesel fuel, and a wide boiling range distillate fuel supplied by Texaco. Average hydrocarbon, carbon monoxide, and nitrogen oxide emissions (without throttling) obtained with diesel fuel were 0.89, 1.88, and 1.91 g/mi, respectively. Hydrocarbon, carbon monoxide and nitrogen oxide levels of 0.88, 0.97, and 1.61 g/mi, respectively, were obtained with the wide boiling range fuel; and emission levels of 1.37, 0.50, and 1.84 g/mi, respectively, were obtained with the unleaded gasoline. Average fuel economies for the diesel fuel, wide boiling range fuel, and unleaded gasoline were 30.8, 29.7, and 28.4 mi/gal., respectively. Thus, the turbocharged catalyst equipped stratified charge engine demonstrated the ability to meet 1975 interim levels on three different fuels with high fuel economy. Compliance with the 1977 hydrocarbon standard of 0.41 g/mi will require additional control devices or basic combustion improvement.

49833 **APTIC NO. 71932**

Environmental Protection Agency, Ann Arbor, Mich., Technology Assessment and Evaluation Branch

EVALUATION OF THE LAFORCE-MODIFIED AMC HORNET. *Preprint, 51p., Dec. 1974. 5 refs.*

Fuel economy and emissions tests (1975 Federal Test Procedure, the Environmental Protection Agency Highway Cycle, and steady- state emissions tests) were performed on a LaForce-modified AMC Hornet. The modified internal combustion engine included the following changes: delayed inlet valve closing, milled cylinder heads, and separation of liquid fuel from the fuel-air mixture. The LaForce engine failed to meet 1975 Federal emission standards for hydrocarbons, carbon monoxide, and nitrogen oxides during EPA testing; and compared to the 1977 standards, the exhaust emissions were approximately 600% too high in unburned hydrocarbons, 565% too high in CO, and 65% too high in NOx. Full-load steady-state tests conducted on an electric chassis dyanamometer indicated that the modifications resulted in a power loss of about 20% compared to an unmodified 1974 Hornet in economy tune. The LaForce modified car delivered about 35% better fuel economy than the stock 1974 Hornet over the 1975 Federal Test Procedure; however, on an equal performance basis, the fuel economy of the LaForce car was not significantly different than that of a standard car. Data from acceleration tests conducted at the General Motors Proving Ground are also included.

49834 **APTIC NO. 72039**

THE RESULTS OF ALL-ROUND INVESTIGATIONS OF CONDITIONS CONCERNING INSTALLMENTS OF EXHAUST GAS DESULFURIZATION UNITS. *(Haien datsuryu sochi secchi jokyo no sogo chosa kekka). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(10):48, Oct. 1974.*

Newly obtained data on the installation of exhaust gas desulfurization units in Tokyo is presented. Most of these units have been installed in the last 2 or 3 yr, although there was a sharp reduction in the number of installations to 74 in 1974 due to a rise in construction costs and tight money. A rapid increase in demand for desulfurization units is expected to follow a tightening of emission standards in the future.

49835 **APTIC NO. 72139**

Japan Environmental Agency

THE FUTURE OF ENVIRONMENTAL CONSERVATION. *In: Quality of the Environment in Japan. p. 57-80, 1974.*

Local air control measures in Japan are evaluated and the scientific research and development upon which conservation is based is discussed. Pollution control on the local level advanced through preventive regulations and pollution prevention agreements with local firms. The use of automatic measurement and concentrated monitoring systems is widespread. Expenditures for anti-pollution measures increased twofold from 1970-1972. In 1972, 432 facilities were ordered to improve pollution control measures. The number of prefectures setting higher standards are tabulated for soot and dust, cadmium and its compounds, fluorine, hydrogen chlorine, and lead its compounds. Problems associated with environmental administration include the prevention of pollution by high speed transportation, long range planning for environmental conservation, and strengthening of environmental controls. Scientific technology on environmental conservation includes: pollution prevention techniques required to minimize emissions from human activities causing pollution; physical, chemical, and biological studies of causes of air pollution and the mobility, composition, and reaction phenomena occurring in these environments; and study and assessment of how pollutants affect man, animals, and plants.

49836 **APTIC NO. 72141**

Japan Environmental Agency

AIR POLLUTION: PRESENT STATE AND COUNTERMEASURES. *In: Quality of the Environment in Japan. p. 95-116, 1974.*

The present state of air pollution in Japan and control measures are discussed. Improvements are noted in carbon monoxide which peaked in 1969 and sulfur oxides which peaked in 1966-1967. The status on nitrogen oxides is not clear, but only one nitrogen dioxide monitoring station of 105 in 1972 was in compliance with the long term environmental standard criteria. Little long term data are available on oxidants and hydrocarbons. The annual mean densities of sulfur dioxide and NO2 are illustrated and the changes in the annual mean values of CO, oxidants, and hydrocarbons in various cities are tabulated. Environmental standards are set for SO2, NO2, and photochemical oxidants. Standards are proposed for lead and hydrocarbons. Emission controls are being tightened for NOx and regulations are placed on smoke and particulate emitting facilities. Control measures are proposed for photochemical oxidants and automobile exhausts. A National Air Pollution Monitoring Network was established with stations at 15 cities across Japan. Other countermeasures include: health protection at mines, promotion of low sulfur fuels, heavy oil desulfurization, stack gas desulfurization, importation of low sulfur crude oil, and use of liquefied natural gas and naphtha.

49837 **APTIC NO. 72142**

Japan Environmental Agency

OTHER POLLUTION PHENOMENA AND THEIR CONTROL. ***In: Quality of the Environment in Japan. p. 143-166, 1974.***

Odor and soil pollution in Japan is discussed and control methods are described. Five substances: ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine were termed malodorous substances and are controlled under the Offensive Odor Control Law implemented May 31, 1972. Soil contamination due to heavy metals which are spread by air and water pollution is a serious impediment to agricultural operations and a health hazard. The Agricultural Land Soil Pollution Prevention Law designates as control areas soils having a concentration of cadmium equal to or greater than 1.0 ppm or a concentration of copper equal to or greater than 125 ppm. Soil pollution control in-depth surveys are also conducted. Agricultural chemicals are another source of soil pollution and are regulated.

49838 **APTIC NO. 72152**

(Inventor not given.)

REMOVAL OF HYDROGEN SULPHIDE CONTAINED IN A GAS OF HIGH CARBON DIOXIDE CONTENT. *(Institut Francais Du Petrole Des Carburants Et Lubrifiants (France)) Brit. Pat. 1,367,0[illegible]. 4p., Sept. 18, 1974. (Appl. June 20, 1972, 11 claims).*

A method for the absorptive removal of hydrogen sulfide from a gas of high carbon dioxide content (3 vol%) is described that precludes the formation of carbonates, a problem associated with alkaline absorbing solutions. The process involves the following steps: contacting the gas with an aqueous solution of ammonium sulfite at a temperature of about 40 C; drying the resulting solution of high ammonium thiosulfate content at a temperature between 110 and 130 C; and decomposing the ammonium thiosulfate to sulfur, ammonia, sulfur dioxide, and water at a temperature between 180 and 200 C. The sulfur is separated from the ammonia, sulfur dioxide, and water, with the latter three constituents being recycled for regeneration of the ammonium sulfite solution.

49839 **APTIC NO. 72153**

(Inventor not given.)

IMPROVEMENTS RELATING TO THE TREATMENT OF GASES. *(Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo (Japan)) Brit. Pat. 1,366,720. 5p., Sept. 11, 1974. (Appl. Dec. 14, 1971, 10 claims).*

A process for the absorptive removal of sulfur dioxide from stack gases is described that overcomes prior art difficulties in simultaneously increasing sulfur dioxide absorption and increasing the conversion of calcium hydroxide or calcium carbonate absorbent to calcium sulfite or sulfate. The gas to be treated is washed with a suspension or slurry of calcium hydroxide or calcium carbonate which is first oxygenated prior to admission to the absorbing unit. In operation the gas passes in series through the absorbing unit, and the absorbing liquid passes in series and countercurrent to the gas through the absorbing units and oxygenation reservoirs.

49840 **APTIC NO. 72154**

(Inventor not given.)

IMPROVEMENTS RELATING TO THE TREATMENT OF GASES. *(Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo (Japan)) Brit. Pat. 1,366,719. 5p., Sept. 11, 1974. (Appl. Dec. 14, 1971, 9 claims).*

A method for the absorptive removal of sulfur dioxide from stack gases is described that eliminates problems of scaling associated with prior art processes using similar absorption agents. The process involves the following steps: washing the gas with a suspension of calcium hydroxide or calcium carbonate in a first absorbing unit at a pH of 4 or less; passing the washed gas from the first absorbing unit to a second absorbing unit where it is washed with a suspension of the same absorbing agent at a pH of 7 or more; and periodically reversing the direction of gas washing between the two absorbing units.

49841 **APTIC NO. 72155**

(Inventor not given.)

APPARATUS FOR THE ELECTROSTATIC REMOVAL OF DUST. *(Polysius AG, Neubeckum (West Germany)) Brit. Pat. 1,366,574. 3p., Sept. 11, 1974. (Appl. March 29, 1972, 5 claims).*

A method for the electrostatic precipitation of dust-laden gases from cement factory preheaters is described that requires no exhaust gas cooling and minimum heat consumption to achieve effective dust removal. A bypass is located in the preheater so that either the furnace feed material or the exhaust gases may be bypassed around at least one stage of the preheater. Thus the temperature of the exhaust is reduced in comparison to a no-bypass condition, making the gas more suitable for electrostatic precipitation. In cases where dust removal presents no problems, it is possible to cancel the bypass feed and operate with a minimum of heat consumption.

49842 **APTIC NO. 72161**

(Inventor not given.)

AN EXHAUST SYSTEM OF AN INTERNAL COMBUSTION ENGINE. *(Nissan Motor Co., Ltd., Yokohama (Japan)) Brit. Pat. 1,365,604. 4p., Sept. 4, 1974. (Appl. April 14, 1972, 5 claims).*

A catalytic converter system for internal combustion engines is described that includes a means to maintain the catalyst temperature within a predetermined range for the efficient reduction of nitrogen oxides in the exhaust gas. Upstream of the catalytic converter, the exhaust pipe is encased in a structure such that a space is provided for the flow of a coolant around the exhaust pipe in response to the sensed catalytic temperature. A coolant control valve is actuated in response to the temperature sensor.

49843 **APTIC NO. 72168**

(Inventor not given.)

PROCESS FOR REMOVING OXIDES OF SULFUR, DUST AND MIST FROM WASTE COMBUSTION GASES. *(Mitsubishi Kakoki Kaisha Ltd. and Asahi Glass Co., Ltd., Tokyo (Japan)) Brit. Pat. 1,369,402. 8p., Oct. 9, 1974. (Appl. March 23, 1973, 8 claims).*

A process for the removal of sulfur dioxide, sulfur trioxide, sulfates, dust, and mist from the waste gas of glass melting furnaces is described. The waste gas is contacted with an absorption solution containing at least one alkaline absorbent consisting of sodium hydroxoxide, sodium carbonate, or sodium sulfite. The gas is then cooled to a temperature of 50-90 C and humidified to a saturated or supersaturated condition. The waste stream is finally passed through a glass fiber filter (kept in a wet condition) for dust and mist collection. The preferred form of the invention also provides for the recovery of oxides and dust and their conversion to sodium sulfate which is used as a raw material for glass.

49844 **APTIC NO. 72169**

(Inventor not given.)

PROCESS OF CONVERTING NOXIOUS COMPONENTS IN THE EXHAUST GAS OF AN INTERNAL COMBUSTION ENGINE TO LESS HARMFUL ENTITIES. *(Grace W. R.) and Co., New York) Brit. Pat. 1,369,745. 5p., Oct. 9, 1974. (Appl. June 20, 1972, 7 claims).*

A catalytic oxidation-reduction apparatus for the removal of nitrogen oxides, hydrocarbons, and carbon monoxide from internal combustion engine exhaust is described that allows for improved thermal stability and less catalyst deactivation than prior art systems. The catalyst consists of at least one oxide of copper, chromium, manganese, iron, cobalt, or nickel and/or metallic platinum or palladium. The catalytic support consists of a magnesium aluminate spinel with a surface area of from 7-200 sq m/g. The spinel may be in particulate form, monolithic form, or coated on a monolithic body.

49845 **APTIC NO. 72170**

(Inventor not given.)

IMPROVED COMBUSTION SYSTEM FOR INTERNAL COMBUSTION ENGINE. *(McCulloch Corp., Los Angeles, Calif.) Brit. Pat. 1,364,508. 26p., Aug. 21, 1974. (Appl. Nov. 9, 1971, 5 claims).*

An internal combustion engine design that offers more efficient combustion and less nitrogen oxide formation is described. Several distinct burning loci are provided in an outward and transverse direction from the axis of piston reciprocation. The flow paths which define the burning loci are enlarged during at least a portion of the working stroke of the piston, with each burning loci receiving a stream of combustible fuel and a combustion supporting gas. The mass flow rate of the combustion- supporting gas and the combustible fuel are progressively increased during thy working stroke.

49846 **APTIC NO. 72171**

(Inventor not given.)

EXHAUST MANIFOLD AIR INJECTION SYSTEM OF AN INTERNAL COMBUSTION ENGINE. *(Bendix Corp., Southfield, Mich.) Brit. Pat. 1,365,052. 6p., Aug. 29, 1974. (Appl. Jan. 2, 1973, 5 claims).*

An exhaust manifold air injection system for the oxidation of hydrocarbons and carbon monoxide in internal combustion engine exhaust is described that eliminates the need for a separate control to compensate for changes in the mass of the exhaust gases. The control system utilizes engine-driven air pump that provides a first order control over the mass of air delivered to the exhaust system in proportion to the engine speed. The pump derives its air supply from the engine s intake manifold dowstream of the throttle valve, and thus a second order control is inherently provided for in proportion to the air mass intake of the engine. The system thus injects an air mass into the exhaust manifold that is proportional to the mass of the exhaust emissions.

49847 **APTIC NO. 72361**

STAGE CHARGING REDUCES AIR EMISSIONS. *Environ. Sci. Technol., 8(13):1062-1064, Dec. 1974.*

A sequential scheme for coke oven charging is described that results in smokeless emissions. The stage-charging procedure involves a particular sequence of coal discharging from the hoppers along with the utilization of a specially designed smoke box to ensure a nearly perfect seal over the chuck door opening. The angle of repose of the coal in the hopper as it is loaded from the bunker never exceeds 45 deg. At all times during the charging cycle it is necessary to provide a route for the gas to escape from the oven through the offtakes in order to attain smokeless charges. This is achieved by discharging two hoppers simultaneously before the next hopper is charged. The volume of the former two hoppers is adjusted so that the coal peaked after discharge is as close to the coal line as possible while still assuring that tunnel head opening exists to the center of the oven prior to and during the leveling operation. Maximized aspiration during the leveling operation is achieved with the specially designed smoke box developed for the leveler bar.

49848 **APTIC NO. 75011**

Ethyl Corp., Ferndale, Mich., Research Labs.

EFFECT OF CI 2 ON EMISSIONS FROM A LARGE POWER-GENERATING GAS TURBINE. *13p., 1974. 2 refs.*

Effects of the addition of CI 2 to fuel on specific emissions from a gas turbine used to generate electrical power were determined. Manganese as CI 2 was added to No. 2 fuel oil at concentrations up to 50 ppm to determine its effect on total mass of particulate, particle size, carbon, smoke, inorganic and organic manganese, oxides of nitrogen, and oxides of sulfur at full and half turbine loads. At 25 ppm manganese, CI 2 in the fuel for the gas turbine-generator reduced the Bacharach smoke number from a baseline value of 5.3 to 3.0, where the smoke is invisible to the eye. At the same time, total particulate weight was reduced by 35-50%, and carbon was reduced by 75%. At 50 ppm manganese, CI 2 reduced total particulate an additional 20% (55-70% reduction) and essentially eliminated carbon. There was little or no effect of CI 2 on emissions of NOx and SOx. Only a very small portion of the CI 2 survived the combustion process as organic manganese. Due to a faulty collection device, no particle size data were obtained. (Author summary)

49849 **APTIC NO. 75055**

A.P.T. Inc., Riverside, Calif.

EPA FINE PARTICLE SCRUBBER SYMPOSIUM (SAN DIEGO, 5/28-30/74). *Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 1-248. 102 refs. (May 28-30.)*

NTIS: PB 239355/AS

Topics dealing with the collection of fine particles (solid or liquid particles smaller than about 3 micron) by any type of wet scrubbing device are presented. Subjects covered include: the public health basis for fine particulate control; engineering design considerations for scrubbers; two-phase jet scrubbers, rotating concentric homogeneous turbulence scrubbers; the effects of water injection arrangement on venturi scrubber performance; transmissometer measurements of mean drop size in full scale venturi scrubbers; the relationship of fine particle collection efficiency to pressure drop, scrubbant and particle properties, and the contact mechanism; flux-force/condensation scrubbing; entrainment separators for scrubbers; and future needs for fine particulate control by scrubbing.

1973

49850 **APTIC NO. 71964**

Abbott, J. H.

PERFORMANCE OF PARTICULATE CONTROL DEVICES ON STATIONARY SOURCES. *Preprint, American Inst. of Chemical Engineers, New York, 26p., 1974. 10 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 67th, Washington, D. C., Dec. 4, 1973.)*

Results from laboratory and field tests conducted by the Environmental Protection Agency s Control System Laboratory on various conventional and novel particulate control devices are summarized. Field tests on electrostatic precipitator control of fine particulates (less than 2 micron) from industrial coal- fired boilers reveal overall efficiencies as high as 99.8% and efficiencies as high as 99.3% for particulates as small as 0.1 micron. Conventional scrubbers are not very efficient for fine particulate collection, with efficiencies of about 90% being attained for particle diameters of 1 micron. Venturi-rod scrubbers are much more efficient than conventional venturi scrubbers and give efficiencies of 99.9% for 1 micron particles. Fabric filters show efficiencies as high as 99.8% for particle diameters of 0.5 micron, with the overall efficiency of the baghouse being a function of fabric type, bag condition, cleaning method, and cleaning cycle. Only one novel device tested thus far, viz., a steam hydro scrubber, appears to be a good collector of fine particulates. The scrubber is a high energy user but is capable of overall mass efficiencies of 99.9% on sources (open hearth steel furnaces) containing a large portion of particulates below 1 micron.

49851 **APTIC NO. 69665**

Barnes, Gerald J., Richard L. Klimisch, and Barbara B. Krieger

EQUILIBRIUM CONSIDERATIONS IN CATALYTIC EMISSION CONTROL. *Preprint, Society of Automotive Engineers, Inc., New York, 14p., 1973. 15 refs. (Presented at the Society of Automotive Engineers, International Automotive Engineering Congress, Detroit, Mich., Jan. 8-12, 1973, Paper 730200.)*

By providing a low-energy reaction path, catalytic afterburners may be the most effective automotive pollution control method. Since chemical equilibrium represents the ultimate limit of catalytic treatment of engine exhaust, equilibrium compositions were determined for nine air-fuel mixtures, with overall air-fuel ratios (A/Fs) ranging from 12:1 to 17:1 (lbs air/lbs fuel) for temperatures of 300-1500 F. A computation procedure based on free-energy minimization was used to determine the equilibrium concentrations. These calculations indicated that true equilibration of exhaust gases, in the temperature range considered, would nearly eliminate the major exhaust pollutants. No hydrocarbons, except nonreactive methane, appeared in significant concentrations. Even at the leanest A/F considered, equilibrium nitric oxide concentrations were less than 30 ppm. Thus, the two major reactants in the formation of photochemical smog, HC and nitrogen oxides, are essentially eliminated when the exhuast gases are equilibrated. Only carbon monoxide, of the major automotive air pollutants, is present in significant concentrations at equilibrium, and then only at rich A/F. True equilibria CO concentrations are less than 0.25% for all A/F greater than 14.6. The results also suggest that the formation of ammonia by NO-reduction catalysis is caused by kinetic limitations which prevent the catalytic formation of HC. The formation of NH3 provides an alternate free-energy minimum for the exhaust gas system because of these kinetic limitations. (Author abstract modified)

49852 **APTIC NO. 69376**

Bienstock, D., P. D. Bergman, J. M. Henry, R. J. Demski, J. J. Demeter, and K. D. Plants

AIR POLLUTION ASPECTS OF MHD POWER GENERATION. *Preprint, Stanford Univ., 10p., 1973. 22 refs. (Presented at the Engineering Aspects of Magnetohydrodynamics Symposium, 13th, March 26-28, 1973, Paper VII.)*

Magnetohydrodynamics has very low air pollution potential. In pilot plant tests in which a 2.2 wt% sulfur coal was burned in a cyclone furnace at 200 lbs/hr and 4000 F at a seed concentration of 1 g mole potassium carbonate/kg coal, 99.8% removal of sulfur dioxide was obtained with only 5 ppm SO2 in the gaseous effluent. Operating the combustor with 95% of stoichiometric oxygen and ambient air admitted at 2000 F caused 150 ppm nitrogen oxide emissions or 0.12 lbs nitrogen dioxide/million Btu. This is a 94% reduction from single-stage operation at 102% stoichiometric oxygen. Since the gas cooling rate in the experimental unit was higher than projected for a commercial plant, a commerical plant should have even lower NOx emissions. A mathematical model using the Zeldovich mechanism was adequate to follow the NOx decomposition in the air-rich system; and extended Zeldovich was more appropriate in the fuel-rich regime. Experiments showed that at high slag-rejection rates of greater than 90%, recovery of the potassium seed by aqueous extraction was better than 99%. Cost estimates of a 100 MWe magnetohydrodynamics-steam plant, in which the spent seed is recovered by aqueous extraction and then regenerated with reducing gases to remove the sulfur, showed an operating cost of the seed recovery/sulfur removal steps of 8% of the overall power costs of 10.3 mills/kwh. Seed make up costs have a marginal impact even at K recoveries as low as 95%. The capital costs of SO2 removal are $10.4/kw, approximately 0.2 of that in conventional power plants. (Author abstract modified)

49853 **APTIC NO. 69492**

Bowlus, D. A., G. A. Brown, and G. J. Silvestri

THE WANKEL ROTARY ENGINE AS A STEAM EXPANDER. *American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics; American Society of Mechanical Engineers, Inst. of Electrical and Electronic Engineers; American Inst. of Chemical Engineers; American Nuclear Society; and Society of Automotive Engineers, Proc. Intersociety Energy Conversion Eng. Conf., 8th, Philadelphia, Pa., 1973, p. 1-7. 9 refs. (Aug. 13- 17.)*

The Wankel rotary engine was used in a positive displacement expander application. Studies indicated that the Wankel engine yields equivalent performance to a piston-cylinder expander at considerably reduced engine size and weight. The reason is that the Wankel geometry results in equivalent displacement volumes at smaller overall engine sizes. These observations were confirmed in internal combustion applications. Although there are theoretical advantages, practical matters such as sealing, valving, heat loss, and friction effects may make the Wankel less attractive; thus, an experimental program intended to evaluate the Wankel expander was initiated. To accomplish this, an existing internal combustion engine was redesigned to operate as an expander. The rotating parts of an RC1-60 engine were obtained. By fabricating new end covers and a new trochoid housing to accommodate necessary valving and porting, an expander engine can be made. The design and analysis required for the Wankel expander are described. Of primary concern is the valving, porting, and ducting needed to reproduce a typical pressure-volume diagram of a 600 psia, 1000 F steam cycle. A new rotary valve design that assures the starting of the engine is being fabricated. Also, a digital computer simulation with steam as the working fluid is used to assess design concepts. The real fluid mechanic models of the charging and emptying processes and realistic heat transfer models based on local surface-to-volume relationships are discussed. (Author abstract modified)

49854 **APTIC NO. 69482**

Coutts, H. J., L. E. Leonard, and K. W. MacKenzie, Jr.

COLD REGIONS AUTOMOTIVE EMISSIONS. *Preprint, Environmental Protection Agency, Arctic Environmental Research Lab., Alaska Univ., Geophysical Inst.; and Fairbanks North Star Borough, Dept. of Environmental Services, 53p., Aug. 1973. 20 refs.*

In Fairbanks, Alaska, during February and March 1973, the emissions of 631 vehicles were analyzed at idle, and adjustments were made to reduce carbon monxide and hydrocarbons emitted. The proper adjustment of in-use vehicles could result in approximately a 34% reduction in CO and a 12% reduction in HC produced at idle. Emission levels of propane-gasoline, and diesel-fueled vehicles were measured and compared. Various pollution control devices are discussed and considered for cold weather use including air injection systems (air pumps), catalytic converters, lean mixture operation, and inspection and maintenance programs. Ice fog is considered as it relates to CO emission control. Fuel volatility, cold start, and fuel economy are also discussed. (Author abstract modified)

49855 **APTIC NO. 69832**

Gregory, Derek, P. and Robert B. Rosenberg

SYNTHETIC FUELS FOR TRANSPORTATION AND NATIONAL ENERGY NEEDS. *Preprint, Society of Automotive Engineers, 16p., 1973. 22 refs. (Presented at the Society of Automotive Engineers, National Meeting, Detroit, Mich., May 15, 1973.)*

The possibilities of making methanol, ethanol, hydrogen, and ammonia for use as vehicle fuels is examined. In the short term (beginning in about 8-10 years and having a significant impact within 15 years), oil importation requirements could be reduced by developing an automobile fuel derived from coal. Synthetic gasolines produced from coals will not alleviate pollution problems; these will have to be solved by engine or exhaust system modifications. Methanol from coal may require simpler and cheaper plants; when used as a fuel, it may be cleaner. Methanol can be blended into existing gasolines to stretch available energy supplies without major engine modifications, while future vehicles can be designed to accommodate pure alcohol fuels. In the long run (beyond 1990), major consideration must be given to the use of hydrogen as an automotive fuel. The major problem is the storage tank on the vehicle. This might be solved by using either cryogenic liquid or some form of hydride or ammonia. Considerable research is needed in this area. The incentive for such research is the potentially unlimited quantities of such fuels. (Author conclusions)

49856 **APTIC NO. 69831**

Hazard, Herbert R., Robert D. Fischer, and Clarence McComis

LOW EMISSION BURNERS FOR AUTOMOTIVE RANKINE CYCLE ENGINES. *Battelle Memorial Lab., Columbus, Ohio, Columbus Labs., Office of Air and Water Programs Contract EHS 70-117, Rept. APTD-1516, 47p., April 1973. 8 refs.*

NTIS: PB 238093/AS

Burners of four different designs for application to automotive Rankine cycle engines were optimized and tested for performance and emission characteristics as part of a combustion technology program designed to develop a full-scale burner for such applications. A burner design which met all of the contract requirements, including emission values of 16.25 g/kg fuel for carbon monoxide, 1.38 g/kg for nitrogen oxides (as nitrogen dioxide), 0.48 g/kg hydrocarbons, and 0.10 g/kg particulates, could be operated over the firing range from 110 to 1 lb fuel/hr. It was a rich primary burner having internal cooling of the primary zone with boiler tubes. The effect of exhaust gas recirculation on NOx emission was explored using the above burner configuration and another burner; NOx emissions were significantly reduced in both cases. The effect of fuel nitrogen was investigated by firing fuel doped with varying amounts of pyridine into another burner configuration. A significant proportion of the nitrogen in the pyridine was converted to NOx, with the proportion varying from about 90% for 0.01% fuel nitrogen to about 55% with 0.44% fuel nitrogen. A significant proportion of fuel nitrogen occurring in natural organic compounds appeared to be convertible to NOx in a similar manner.

49857 **APTIC NO. 71922**

Kaibara, Takaaki, Toru Yoshii, and Yasuji Iwabashi

ODORLESS CHEMICAL RECOVERY UNIT. *Text in Japanese. Mitsubishi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 10(5):697-702, Sept. 1973. 3 refs.*

Field tests were conducted on an odorless chemical recovery furnace. Total reduced sulfur values as low as 0.1-0.5 ppm were measured during operation with 10% overload or with a black liquor having 55.5% solids. Graphical data were also obtained on the following relationships: char bed temperature versus the emission of hydrogen sulfide, sulfur dioxide, and fly ash; H2S concentration on the char bed as a function of air-fuel ratios; and equilibrium variation with temperature.

49858 **APTIC NO. 71883**

Kasaguchi, N., B. Okamoto, and M. Kuragasaki

THE VARIATION OF GAS ELEVATION WITH THE SECTIONAL CONFIGURATION OF STACK EXIT NOZZLE. *Text in Japanese. Mitsubushi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 10(5):630-635, Sept. 1973.*

Wind tunnel tests of variation in stack gas elevation height with the sectional configuration of the stack exit nozzle are reported. Relative elevations for common stacks versus three-nozzle stacks, four-nozzle stacks, and coupling stacks are illustrated as well as variations in both elevation and concentration of the stack plume at vatious downwind distances. The most favorable sectional nozzle configuration for a stack exit is concluded to be a circle.

49859 **APTIC NO. 71953**

Liederman, David, Sterling E. Voltz, and Stephen M. Oleck

EVALUATION OF CO/HYDROCARBON OXIDATION CATALYSTS FOR AUTOMOTIVE EMISSION CONTROL SYSTEMS. *Preprint, American Chemical Society, Washington, D. C., p. 15-32, 1973. 11 refs. (Presented at the American Chemical Society Meeting, Dallas, Tex., April 8-13, 1973.)*

A wide variety of laboratory screening tests have been devised for carbon monoxide/hydrocarbon oxidation catalysts. Some of these tests are described, and the catalyst evaluation sequence, factors affecting laboratory screening tests, evolution and procedures of low temperature oxidation catalyst screening tests, tests for determination of catalyst durability, and correlation of laboratory catalyst screening with converter performance of engine dynamometers and concept vehicles are discussed. The two main criteria for a good screening test are that it reliably reflects the behavior of the catalyst in its planned use and that it can be done in a reasonably short time. Some of the key factors associated with laboratory screening tests are the type of catalyst (pelleted or monolithic), the reactant atmosphere (synthetic gas mixture or real engine exhaust), temperature (isothermal or adiabatic), space velocity and reactor (integral, differential, or specialized type). Some of the tests are incremental steay-state, dynamic rapid warm-up, and isothermal activity tests. Comparisons between the results from laboratory tests and the performance of full-size converters on engine dynamometers and vehicles must be made periodically to insure that the laboratory tests continue to be adequate. A typical behavior of catalysts can suggest ways to obtain more meaningful results from laboratory tests and can improve correlations with converter performance.

49860 **APTIC NO. 71949**

Metcalfe, T. B. and A. Ruangteprat

THE CHOICE OF HYDRODESULFURIZATION CATALYST PELLET SIZE. *Preprint, American Inst. of Chemical Engineers, New York, 12p., 1973 (?). 6 refs. (Presented at the American Institute of Chemical Engineers Annual Meeting, 65th, New York, Nov. 26-30, 1972.)*

The influence of intraparticle mass transport on the heterogeneous catalyzed hydrodesulfurization process was determined. The catalyst was pelleted as relatively thin wafers. The large complex sulfur-containing hydrocarbon molecules were molecularly diffused through the pores of the solid catalyst to the available catalytic surfaces. The solid cobalt-molybdenum catalyst was pelletized in wafers of varying thicknesses to find the limiting diffusion path length for a catalyst of this activity. A path length of 1/8 in. or less was necessary for full utilization of the catalyst. (Author abstract modified)

49861 **APTIC NO. 71893**

Meyerovskaya, V. I., N. U. Rizayev, R. Z. Khiterer, and Y. A. Kazakova

PROCESSING OF GASES FROM THE THERMAL FIXATION OF ATMOSPHERIC NITROGEN. *(Pererabotka gazov termicheskoy fiksatsii atmosfernogo azota). Text in Russian. Dokl. Akad. Nauk Uz. SSR, 39(9):32-34, 1973. 2 refs.*

An improved method for the adsorption of nitrogen dioxide in the presence of carbon dioxide in the high-pressure thermal fixation of atmospheric nitrogen in nitric acid production combined with energy generation is presented. The thermal energy generated during the oxidation of atmospheric nitrogen for nitric acid production is utilized in a high-pressure steam generator. The nitrous gases containing about 5.5% CO2 are adsorbed in wetted silica gel with about 5% water in a plate-type adsorber. Wetting was necessary to improve the adsorption of NO2. At a temperature of 0 or 20 C and under a pressure of 16 atm, the absorption coefficient of CO2 was 0.02. Wetted silica gel with about 5% water superior to dry silica gel in terms of adsorption efficiency also in the absence of CO2.

49862 **APTIC NO. 69595**

Miller, William L.

GEOTHERMAL ENERGY AND THE ENVIRONMENT. *Colorado Geological Survey, Denver, Dept. of Natural Resources, Geotherm. Energy Colo. Proc. Symp., Denver, Colo., 1973. (Colorado Geological Survey Bulletin no. 35), p. 61-70. 8 refs. (Dec. 6.)*

The future development of geothermal energy resources in the U. S. and throughout the rest of the world can be expected to affect the integrity of the surrounding environment in varying ways and to varying degrees. Before development can begin, all the environmental implications must be considered. Probably the single greatest environmental impact will be the disturbance of the land and the resulting changes in its utilization. The withdrawal of large volumes of fluids from hot-water geothermal reservoirs could cause subsidence of the land surface as a result of reduced fluid pressure. An associated effect of the reinjection of geothermal fluids and of subsidence might be an increase in seismic activity. Well blowouts or uncontrolled, sudden, and violent release of steam or hot water into the atmosphere could cause safety hazards, pollution of air and water, noise, and partial resource loss. Geothermal fluids normally contain dissolved gases, including hydrogen sulfide, carbon dioxide, carbon monoxide, methane, ammonia, and mercury vapor. The gases are released to the atmosphere with the steam when the fluid flashes at the surface during the bleeding and venting of the wells, at the gas ejector vents on the condensers, and at the cooling towers after generation of power. These gases may be corrosive and hazardous to the safety and health of persons living and working near the plant. The production of potentially valuable associated geothermal by- products, demineralized water, and mineral salts, could have beneficial consequences. Fish and wildlife in the area also might be affected.

49863 **APTIC NO. 69449**

Morgan, Dean, Parimal Patel, Edward Doyle, Robert Raymond, Ravinder Sakhuja, and Ken Barber

LABORATORY TEST RESULTS LOW EMISSION RANKINE-CYCLE ENGINE WITH ORGANIC-BASED WORKING FLUID AND RECIPROCATING EXPANDER FOR AUTOMOBILES. *Preprint, Thermo Electric Corp., Waltham, Mass., Research and Development Center and Environmental Protection Agency, Ann Arbor, Mich., Div. of Advanced Automotive Power Systems Development, 7p., 1973 (?).*

A low-emission Rankine-cycle propulsion system for automobiles was developed using an organic-based working fluid, Fluorinol- 85 and a reciprocating expander. The system was designed to fit into the production Ford Galaxie with modifications required only to the engine compartment and to the grill/bumper for installation of the Rankine engine. A full-scale system was constructed and tested in a laboratory. During the laboratory testing, actual operating conditions were duplicated as closely as possible. System power and efficiency could be measured over the complete range of operating conditions expected in the vehicle. Measurements concentrated on development of the steady- state hp/speed/efficiency map of the system. Expander testing has been underway since Oct. 1972 on both a single cylinder test expander and the V-4 expander for the system. The system is described, and test results are given. Acceleration performance and driving cycle fuel consumption predictions are presented. The system can be competitive in performance and fuel economy with the 1972 351 cu in. displacement internal combustion engine. Measured emissions from system tests confirmed the potential of the Rankine-cycle engine to give emission levels substantially lower than the 1976 Federal standards. (Author abstract modified)

49864 **APTIC NO. 71952**

Muraleedharan T. S., P. V. N. Nair, and K. G. Vohra

SOME NEW IDEAS ON AIR POLLUTION CONTROL TECHNIQUES. *Central Labour Inst., Bombay (India), Proc. Semin. Air Pollut. Control Tech., India, 1973, p. 23-30. 8 refs. (Sept. 11-12.)*

A method for the conversion of sulfur dioxide to sulfuric acid aerosols as well as for the gas-to-particle conversion of other pollutants is described along with a precipitator for submicron particles based on water vapor condensation. The new mechanism for SO2 conversion to H2SO4 is based on laboratory studies (under simulated atmospheric conditions) involving the singlet exicted state of molecular oxygen as the oxidizing species. The singlet is produced by irradiating oxygen and ozone under ultraviolet light. The singlet oxygen initiates SO2 oxidation to produce a sulfate radical which in turn reacts with water given first a bisulfate radical and H2SO4. The product, which is a polarized complex cluster, can undergo rapid coagulation and further hydration to give nuclei consisting of solutions of H2SO4 and water. The use of ionizing radiation increases the rate of SO2 conversion by at least one order of magnitude over the photo-initiated reaction. Light and ionizing radiations can also be used to convert nitrogen dioxide and chlorine to aerosols. A precipitator with an efficiency of 99.9% for submicron particles is also cited. The device consists of a gap in which a vapor concentration gradient is established by means of two surfaces, one evaporating which acts as the source of vapor and the other condensing which acts as the sink. Aerosol particles are dragged towards the sink by Stefan flow, which is proportional to the vapor concentration gradient. The precipitator can handle high humidity gases at high efficiency.

49865 **APTIC NO. 69369**

Rabenhorst, David W.

SUPERFLYWHEEL ENERGY STORAGE SYSTEM. *National Science Foundation, Washington D. C., Research Applied to National Needs, Wind Energy Convers. Syst., Workshop Proc., Washington, D. C., 1973, p. 137-145. 3 refs. (June 11-13.)*

NTIS: PB 231341

A new superflywheel concept has been developed which offers greatly improved safety and performance. Its configuration allows sufficient distribution of failed particles in size, direction, and total time; thus, effective failure containment appears to be a practical objective. The new energy storage system will considerably enhance the performance of future onsite energy systems such as solar and wind energy systems. Its chief advantages will be lower total cost and freedom of maintenance of the storage system. It will have several times the operating life of lead-acid batteries, and will readily accept the high-power peaks associated with heating and air conditioning equipment.

49866 **APTIC NO. 75026**

Rohde, Wolfgang and Kurt-Guenther Beck

PRECARBON, A NEW METHOD FOR THE USE OF PREHEATED COKING COAL. *(Precarbon, ein neues Verfahren fuer den Einsatz vorerhitzter Kokskohle). Glueckauf (Essen), vol. 109:348-354, 1973. 11 refs. Translated from German, 26p.*

The use of preheated coking coal for production of blast furnace coke has been gaining increased attention. The status of preheating technology and the methods used in France, England, the U. S., and South Africa are surveyed. The Precarbon process being operated in the test coke plant of the Coal Mining Union is described. The process uses an integrated unit composed of a two-stage fluidized bed dryer and a new type of conveyor charging system. The first results from the first year and a half of test operation are reported. The operating conditions, heat engineering, throughput, and effect of the coking conditions on the coke quality are discussed. The economic aspects of the preheating technology are also described. The methods for controlling pollution from dust and flue gas are mentioned.

49867 **APTIC NO. 72376**

Seifert, G. and P. Schoch

STUDY CONCERNING HYDROLYTIC COS REMOVAL FROM OIL PRESSURE GASIFICATION GASES. *(Untersuchungen zur hydrolytischen COS-Entfernung aus Oeldruckvergasungsgasen). Text in German. Freiberger Forschungsh. A, no. 519:91-98, 1973. 18 refs.*

Autothermal conversion of fuel oils with oxygen and water vapor at temperatures above 1250 C and a pressure of about 30 kg force/sq cm yields a gas containing 2 to 2.5% carbonyl sulfide and hydrogen sulfide. For removal of this COS several methods are available of which the catalytic conversion of COS with water vapor to H2S at temperatures between 100 and 350 C and subsequent removal of the H2S is discussed. In experiments concerning the COS conversion of gases from oil pressure-gasification plants for the production of synthesis gas the coefficient of completeness X subscript COS for defined operation conditions was 0.62. The extrapolation to other conditions and thus the application for the general pre-calculation of industrial reactors for COS conversion seems to be possible within certain limits, but at present this is not supported by experimental evidence.

49868 **APTIC NO. 71921**

Tsuda, Mitsushige, Toshio Funakoshi, Hayami Nagano, Tetsuo Yamamoto, and Masashi Hirao

CATALYTIC OXIDATION PROCESS FOR ODOR REMOVAL. *Text in Japanese. Mitsubishi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 10(5):691-696, Sept. 1973. 8 refs.*

Various catalytic oxidation systems were experimentally tested for odor control. A catalyst consisting of platinum and aluminum oxide was the most efficient for removing odors. Most of the odorants tested were oxidized at operating temperatures below 300 C. The endurance performance of the catalyst was very satisfactory with a suitable pretreatment device for dust removal.

49869 **APTIC NO. 72006**

Honda Motor Co., Ltd.

TECHNICAL REPORT ON HONDA CVCC SYSTEM. *In: Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part 2. 93rd Congress (Senate), First Session, Serial 93-H9, p. 519-558, May 14, 17, 18, and 21, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

The design, operation, and emission characteristics of the Honda compound vortex controlled combustion stratified charge engine are described. The engine is capable of meeting 1975 Federal emission requirements without using an exhaust gas treatment. Hydrocarbon, carbon monoxide, and nitrogen oxide emissions from a two-liter Honda CVCC (manual transmission) are: 0.17, 2.25, and 0.89 g/mi as measured over the 1975 Federal Test Procedure. Data are also given for an experimental CVCC-Vega (140 cu in. engine) and for a CVCC Impala (350 cu in. V-8).

49870 **APTIC NO. 72008**

Curtiss-Wright Corp., Wood-Ridge, N. J.

A REPORT ON THE ROTARY ENGINE. *In: Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part 2. 93rd Congress (Senate), First Session, Serial 93-H9, p. 625-702, May 14, 17, 18, and 21, 1973. 75 refs. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

Developments in the Curtiss Wright rotary combustion engine are reviewed along with emissions data obtained during several tests. Typical exhaust emission results (California Cycle) for a Ford Galaxie powered with an RC2-60U5 rotary engine and an exhaust reactor ranged from 0.77-1.47 % for carbon monoxide, 378-607 ppm for nitrogen oxides, and 90.3-108 ppm for hydrocarbons. Data are also presented to illustrate that the rotary engine without pollution control is inherently as clean or cleaner than conventional piston type engines. Research on the stratified charge rotary charge engine is also reviewed.

49871 **APTIC NO. 72009**

Engelhard Minerals and Chemicals Corp.

VEHICLE DURABILITY TEST OF PTX TYPE IIB CATALYST. *In: Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part 2. 93rd Congress (Senate), First Session, Serial 93-H9, p. 903-910, May 14, 17, 18, and 21, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

Durability test data for numerous road tests (32 mph average speed) of a PTX type IIB catalyst on vehicles powered with 351 cu in. V-8 engines and equipped with exhaust gas recirculation are reported. Hydrocarbon, carbon monoxide, and nitrogen oxide emissions are reported for mileages of up to almost 60,000. Supplementary remarks are given with each run to explain operating conditions and adjustments made. Hydrocarbon, carbon monoxide, and nitrogen oxide emissions for one run at 58,808 miles were 0.54, 0.86, and 5.56 g/mi. The major number of catalyst failures occurred because of melting of the substrate.

49872 **APTIC NO. 75074**

National Academy of Sciences, Washington, D. C. Committee on Motor Vehicle Emissions

NAS REPORT ON TECHNOLOGICAL FEASIBILITY OF 1975-76 MOTOR VEHICLE EMISSION STANDARDS. AUTOMOTIVE SPARK IGNITION ENGINE EMISSION CONTROL SYSTEMS TO MEET THE REQUIREMENTS OF THE 1970 CLEAN AIR AMENDMENTS (PANEL REPORT). *Office of Air and Water Programs Contract 68-01-0402, 114p., May 1973.*

NTIS: PB 224862

Data available on the performance of emission control systems for spark ignition engines that approach the degree of control required to meet the 1975 and 1976 automobile emission standards as required by the 1970 Clean Air Amendments are summarized. The emission controls investigated include engine operation modifications, thermal reactors, oxidation and reduction catalysts, exhaust gas recirculation, secondary air systems, and fuel modifications. Also included are alternative engine designs such as the stratified charge concept, Wankel rotary engines, divided combustion chamber engines, and dilute combustion engines. Conventional carbureted spark ignition engines with modifications and oxidation catalysts for hydrocarbon and carbon monoxide emissions control appear capable of meeting the 1975 standards, although the hydrocarbon and CO emissions generally increase with mileage because of catalyst deterioration. The durability of nitrogen oxide catalysts for meeting the 1976 standards is poor and its potential for achieving adequate emission control is questionable.

49873 **APTIC NO. 75076**

NON-POLLUTING ENGINE. *In: Down-To-Earth Applications of Rocket Engine Technology. Rockwell International Corp., Canoga Park, Calif., Rocketdyne Div., p. 3-6, 1973 (?).*

NTIS: N74-31275

A non-polluting engine for generating electricity is described that is based on technology established in the rocket engine industry. The engine, a modified Apollo/Saturn V moon rocket power plant, has a combustion system that operates on a mixture of a light hydrocarbon and liquid oxygen. This mixture burns in a high pressure chamber just as liquid fuel and liquid oxygen burn in rocket engines. The space power unit is connected to an existing turbine-generator, replacing the coal-fired boiler, and is designed to generate 11,000 KW of electricity (enough power to serve about 10,000 homes). The engine can virtually eliminate emissions of particulates and other pollutants without the noise normally associated with rocket engines. A project is underway to install the engine at Commonwealth Edison s generating station near Joliet, Illinois.

1972

49874 **APTIC NO. 71920**

Akolzin, P. A., A. S. Klimanov, and E. N. Panova

THE PRODUCTION OF TECHNICAL NITROGEN FROM FURNACE GASES FOR POWER EQUIPMENT CORROSION PROOFING. *Sov. Power Eng. (Engl. Transl.), no. 10:734-736, Oct. 1972. 3 refs.*

A scheme for the removal of carbon dioxide, sulfur dioxide, hydrogen sulfide, nitrogen oxides, and suspended particulates from coal-burning power plant furnace gases and the recovery of nitrogen gas for use in preventing corrosion of equipment during down time is described. The furnace gases, which can be taken from the boiler unit or produced directly in the burning of coal, contain from 75-85% nitrogen and can be treated to yield nitrogen which is then used to displace air from non-operating equipment susceptible to corrosion. Oxygen residues in the furnace gas can be removed by passing the gas through heated charcoal, anthracite, coke, or other reducing materials, while suspended material and acid combustion products can be removed by contacting the furnace gas with an alkaline absorbent solution. The latter can be obtained from anoinite filters of the condensate purifier or from desalinization equipment. A pilot installation incorporating the above scheme is described for a system providing nitrogen at a maximum output of 18 cu m/hr.

49875 **APTIC NO. 71992**

Gompf, Henry I.

EVALUATION OF THE AIR-JET DEVICE-AIR BLEED. *Environmental Protection Agency, Ann Arbor, Mich., Control Device Evaluation Section, Rept. APTD-1377, 8p., Aug. 1972.*

NTIS: PB 220002

Exhaust emission tests (1975 Federal Test Procedure) were conducted on a 1970 Valiant (225 cu in. six-cylinder engine and automatic transmission) equipped with an engine vacuum actuated valve which allows air to bleed into the engine s positive crankcase ventilation system and subsequently to the intake manifold. The Air-Jet device is installed in the PCV line between the crankcase and the carburetor and requires cutting the PCV line. Reductions in hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides resulting from the device were 6, 16, 0, and 2%, respectively over the 1975 Federal Test Procedure. The only substantial effect appeared to be a reduction in carbon monoxide.

1971

49876 **APTIC NO. 71546**

Berube, D. T.

LOW GAS TEMPERATURE SOLUTION TO HIGH RESISTIVITY ASH PROBLEMS. *Bureau of Mines Information Circ., no. 8543:70-82, 1971. 1 ref.*

The effect of lowering gas temperature on the fly ash collection efficiency of an in-service electrostatic precipitator used in conjunction with 180 MW boiler fired with low-sulfur coal is reported. Initially disappointing recovery efficiencies in the range of 85% (at less than 100% load) were increased to almost 96% by reducing the gas inlet temperature to the predcipitator from 300 F to 220 F. The temperature reduction was achieved by increasing the economizer surface, reducing the use of a steam coil heater, and increasing airflow through the main air heater.

49877 **APTIC NO. 69591**

Chrystman, J.

INDUSTRIAL AIR POLLUTION CONTROL ENGINEERING. *Environmental Protection Servive, Ottawa (Ontario), Air Pollution Control Directorate, APCD 71-11, 27p., 1971. (Presented at Guelph University, Guelph, Ontario, Nov. 4, 1970 and Nov. 3, 1971.)*

Various types of pollution control methods are reviewed. The hardware is available in a wide variety of designs. There is a wide latitude in collection efficiency, initial cost, operating and maintenance costs, space, arrangement, materials of construction, and operational reliability. In selecting control equipment for a specific job, factors such as physical and chemical properties of the contaminants, carrier gas characteristics, and process and operational factors must be considered. The two basic air pollution control concepts are to concentrate and contain and to dilute and disperse. The methods falling into these concepts are: reduction at the source through raw material changes or practice or modification or replacement of process equipment, reduction of contaminant discharge at the source by application of control equipment; reduction of contaminant by timed emission during peridos of adverse meteorological conditions; dilution of the source discharge by the use of tall stacks; and dispersion of source locations through allocation of land usage. Actual control equipment for particulate matter includes settling chambers, impingement separators, panel filters, inertial separators, wet collection devices, baghouses, and electrical precipitators. Equipment for control of gaseous pollutants includes incineration, adsorption, absorption, and condensation equipment.

49878 **APTIC NO. 71549**

Hillier, Lloyd and B. W. Rudiger

LIGNITE AND THE CYCLONE BURNER IN A NEW 235-MW GENERATING STATION. *Bureau of Mines Information Circ., no. 8543:112-126, 1971.*

A 235 MW lignite-burning generating station is described. The turbine is a tandem compound two flow reheat steam type and is provided with a dust collector at the output. Cyclone burners alleviate problems of slag and ash buildup by converting about 75% of the total ash to molten slag which is trapped at the bottom of the furnace. About 26% of the total ash enters the mechanical dust collector. Fly ash is conveyed via a vacuum system to a storage silo, and bottom ash is sluiced to a disposal pond. A dustless unloader is provided for the gravity discharge of the stored fly ash into trucks.

49879 **APTIC NO. 71548**

Janssen, Kent F. and Floyd W. Redman

PILOT STUDY OF ELECTROSTATIC PRECIPITATION FOR REMOVING FLY ASH AT BASIN ELECTRIC S LELAND OLDS STATION. *Bureau of Mines Information Circ., no. 8543:98-104, 1971.*

A one-chamber, two-section electrostatic precipitator was pilot tested for its efficiency to remove fly ash from a lignite-fired boiler with a 1,570,000 lb/hr steaming capacity. The resistivity of the fly ash was 6 times 10 to the 8 ohm/cm at 300 F and 10% moisture by volume. Efficiency of fly ash removal ranged from 98.8 to 99.8% over precipitator gas temperatures of 250-590 F and inlet gas loadings of 0.535-1.122 gr/cu ft. Maximum collection efficiency occurred at about 80% of the maximum power input to the precipitator. Above this value, light sparking was observed in conjunction with performance drop-off. Face velocity did not affect precipitator performance significantly. It was ncecessary to operate the rappers at high impact intensity and relatively high frequency to insure adequate cleaning of the precipitator. Electrostatic precipitation appeared to be a practical and effective method for the collection of fly ash from the lignite-fired boiler tested.

49880 **APTIC NO. 71547**

Ma, James L.

COLLECTING FLY ASH FROM WESTERN LOW-SULFUR COALS. *Bureau of Mines Information Circ., no. 8543:83-97, 1971. 2 refs.*

A variable throat venturi type and a fixed cone impingement type scrubber were pilot tested as alternative methods to electrostatic precipitation for the removal of fly ash from utility boilers burning low-sulfur, high-resistivity Western coals. Both types of lime scrubbers were efficient in removing the fly ash, with the variable throat venturi type being slightly more so. Fly ash scrubbing efficiency increased with pressure drop, and the rate of increase was greater in the lower pressure drop range (4-12 in. water) than in the higher pressure drop range (12-24 in. H2O). Above 24 in. of pressure drop, the scrubbing efficiency asymptotically approached 100%. At a pressure drop of 6 in. 98-98.5% of the fly ash was removed; and, at a pressure drop of 12 in., 99.0-99.3% removal efficiency was obtained. Both the liquid recirculation and bleedoff rates showed an effect on the fly ash removal efficiency, but the effects were samll compared to the effect of pressure drop. The variable throat venturi scrubber showed a much greater turn-down ratio than the fixed cone impingement scrubber. Fly ash settled rapidly from the slurry, indicating that in a closed circuit operation in clear effluent can be promptly recycled to the scrubber. (Author conclusions modified) cled to the scrubber. (Author conclusions modified)

49881 **APTIC NO. 71545**

McGuire, E. F. and W. F. Arndt

USE OF WESTERN COAL AND AIR-WATER QUALITY CONTROL BY MINNESOTA POWER AND LIGHT COMPANY. *Bureau of Mines Information Circ., no. 8543:40-48, 1971*

Field tests of a conventional wet throat venturi scrubber using a centrifugal mist eliminator and a spray chamber scrubber using low gas velocities and high-pressure water sprays for the collection of fly ash from 60 MW boilers burning low-sulfur subbituminous coal are described. The wet throat venturi scrubber resulted in adequate particulate collection efficiencies at about 5 in. pressure drop and at an acceptable turn-down ratio. Water makeup and recycle capability were also acceptable. The spray chamber, which featured a chevron-type mist eliminator, showed acceptable efficiencies at a pressure drop of 1.5 in. water. Performance of the unit was increased by air volume reductions. The unit also showed acceptable water makeup and recycle capabilities. Selection and further testing of the spray chamber unit showed anticipated problems involving dry-wet zone buildups and corrosion of downstream parts. An anticipated problem that failed to appear was that of plume buoyancy and dispersion.

49882 **APTIC NO. 71929**

Moeller, Wolfgang

A SYSTEMATIC INVESTIGATION OF THE CORROSION OF GAS TURBINE MATERIALS AT TEMPERATURES ABOUT 700 C BY FLUE GASES OF IMPURE FUEL OILS. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-37. 39 refs.*

The metal alloys Nimonic 80A and S 590 (gas turbine materials) were exposed up to 1000 hr at temperatures of 650-750 C to flue gases from a test boiler burning various distillate oil blends. Metallurgical analysis of the exposed samples by means of metallography, electron microprobe analysis, and X-ray diffraction revealed corrosion of both alloys, with oxides of sulfides rich in alloy elements being present at the phase boundary of the metallic structure. Distillate oil containing small or medium amounts of sulfur caused no corrosion over and above that resulting from oxidation in air. Fuel oil containing sulfur and vanadium, however, increased the weight losses of both alloys. The addition of sodium to the latter blend resulted in a reduction of corrosion for Nimonic 80A; the weight losses of S 590, however, did not decrease in the presence of sodium and were quite large at 700 C. In all cases the observed scales were of the multilayer type and very porous, with S 590 being attacked more than Nimonic 80A. The high temperature corrosion appeared to be a process of growing and spalling of degenerated scale produced by a gas-solid reaction rather than a dissolution of protective oxide layers or the metal itself.

49883 **APTIC NO. 71521**

Tyler, J. R. and R. C. Smith

THE DESIGN OF A 3000 HP INDUSTRIAL GAS TURBINE. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-34. 2 refs.*

Design considerations for a 3000 horepower industrial gas turbine are outlined. Construction requirements are discussed for the compressor, the compressor dirving turbine, a high pressure shaft arrangement, the turbine casing, the combustion system, the turbine stator, the power turbine unit, and the operational control system. A fuel-injected, multiple-chamber combustion system which is capable of burning either distillate oil or fuel gas is described. The burning of natural gas results in less smoke emissions. The control system includes a means to detect engine exhaust temperature and flame failure. An electronic system is used for opening the blow-off valves on a speed plus acceleration signal during changing load conditions.

49884 **APTIC NO. 71522**

Vogts, Josef

GAS TURBINE FOR RAIL VEHICLES. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-26.*

The advantages of gas turbine engines over diesel engines for powering rail vehicles are outlined in terms of operation, economy, and exhaust emissions. Carbon monoxide, nitrogen oxide, and hydrocarbon emission rates from a typical turbo train are 2.8-11.3, 2.3-8.9, and 0.0-0.96 g/train km, respectively, as compared to 25.4-115, 36.8-128, and 0.11.5 g/train km for diesel-powered trains. The continuous combustion of a gas turbine is also easier to control than the much faster combustion in a diesel engine. Procurement and operating costs of gas turbine trains are less than those for diesel trains, especially for high speed rail transport.

1967

49885 **APTIC NO. 75049**

Delyagin, G. N. and B. N. Smetannikov

COMBUSTION OF COARSELY DISPERSED COAL-WATER SUSPENSIONS IN CYCLONE FURNACES. *(Szhiganiye krupnodispersnykh vodougol nykh suspenzii v tsiklonnykh topkakh) Inst. of Fossil Fuels (USSR), p. 112-122, 1967. 13 refs. Translated from Russian, 25p.*

The combustion of highly watered solid fuel without preliminary mechanical dewatering and without preliminary thermal drying is discussed. This process can simplify the operation of fuel-power facilities and can be used to dispose of water-coal suspensions from flotation cleaning of coal by using the suspensions as a fuel. The combustion method is highly promising, particularly in industrial power installations located close to enterprises that are a source of the watered fuel. A uniform coal-water mixture (suspension) is prepared with a solid phase particle size not greater than 0.2 mm from the watered solid fuel. Combustion of coarsely dispersed coal-water suspensions in a cyclone furnace which can solve this problem is described. The effects of moisture content on the stability and transportation of the suspensions, the effects of coal composition on combustion, the effects of viscosity of the suspensions on combustion and methods to reduce viscosity, the effects of ash content on combustion, and the results of several laboratory and pilot plant tests on combustion of suspensions in cyclone furnaces are reviewed

49886 **APTIC NO. 75015**

Kramarenko, S. S. and G. Y. Lebedeva

COMBUSTION OF HIGH-MOISTURE WASTES OF COAL CLEANING PLANTS. *(Sziganiye vysokoobvodnennykh otkhodov ugleobogatitel nykh fabrik). (Source not given.) 1967 (?). 3 refs. Translated from Russian, 6p.*

During the wet cleaning of coking coals, a waste consisting of a 10-15% water suspension of coal with an ash content of 60-80% is formed. Presently these wastes are removed in sedimentation tanks, which causes loss of potential heat and pollution of air. The high moisture content and ash content of the wastes severely hampers utilization of their potential heat and purification of the water for reuse for technological purposes. A method of recovering heat and water through burning the wet combustible material with incomplete evaporation of the moisture is described. The efficiency of the process was studied experimentally. The kinetics of oxygen absorption in burning these flotation tailings are described.

1941

49887 **APTIC NO. 65101**

Lepoivre, A., A. Pignot, A. Leroy, and A. Martin

GASOGENE FUELS, GASOGENES, MOTORS FED WITH GENERATOR GAS; FUEL COAL GAS; FUELS DERIVED FROM CALCIUM CARBIDE; LUBRICATING OILS. *National School of Internal Combustion Engines, Conf. Mfr. Use Replacement Fuels Lubr., p. 1-162, 1941. Translated from French, 198p.*

Presentations are given on the feasibility of manufacturing and using replacement fuels and lubricants for internal combustion engines, including those designed for vehicular use. Topics covered include: gasogene fuels derived from wood, charcoal torrefied wood or brown charcoal, mineral fuels (coal, cokes, and semicokes), and briquets, the components of gasogene installations including gas generators, coolers, purifiers, and air and gas mixing chambers, engines fed with producer gas, the use of fuel coal gas from gas plants and coking plants, the use of calcium carbide produced acetylene to feed internal combustion engines, and various lubricating oil alternatives, including castor oil, olive oil, and graphited oils. The replacement fuels are considered in terms of their combustion efficiency, availability, feasibility for application, and possible safety hazards.

MEASUREMENT METHODS

1975

49888 **APTIC NO. 72405**

Barnes, R. A.

A SIMPLE SAMPLER TO MONITOR SULPHUR OXIDE EMISSIONS FROM A CEMENT WORKS. *Atmos. Environ., 9(1):131-133, Jan. 1975. 2 refs.*

A sampler and technique for monitoring sulfur dioxide emissions between the kiln and stack in cement plants are described. Problems involving the sampling of heavily dust-laden gases at high temperatures are overcome with a sampler that uses the vacuum created by a water ejector to draw the sample from the duct. The exhausted water then supplies cooling water to the top of a Graham condenser before being drained. The gas sample from the duct passes through the condenser before entering the drechsel bottle, and a cooling down to 20 C is obtained even with gases of 230 C (duct temperature). The most representative measure of SO2 is obtained by inserting into the duct a hard glass tube, approximately 1 m long, with two clean fiberglass filter bags firmly wired over one open end. A stainless steel sinter filter may be used in cases where a high concentration of fine dust is present in the gas.

49889 **APTIC NO. 72387**

Bourdin, M., R. Badre, and C. Dumas

TRAPPING AND CHROMATOGRAPHIC ANALYSIS OF VOLATILE ORGANIC POLLUTANTS IN THE ATMOSPHERE. *(Prelevement sur piege et analyse chromatographique des polluants organiques legers de l atmosphere). Text in French. Analusis, 3(1):34-38, Jan. 1975. 9 refs.*

A method for the trapping and gas-chromatographic analysis of lightweight volatile hydrocarbons in the air is described. The sample to be analyzed in adsorbed in a Porapak Q-filled glass column, after which a condensing loop is cooled by liquid nitrogen to condense the hydrocarbons desorbed from the rest of the column heated at 100 C. With the condensation completed, the condensed hydrocarbons are heated to 140 C for injection to the chromatograph. Analytical experiments with an artificial mixture revealed high precision of the method even for low concentrations. This method is suitable for the analysis of volatile organic compounds in concentrations below 1 ppm.

49890 **APTIC NO. 71688**

Carroll, Herbert B., Jr. and F. E. Armstrong

ACCURACY AND PRECISION OF SEVERAL PORTABLE GAS DETECTORS. ADDITIONAL STUDIES. A SUPPLEMENT TO RI 7811. *Bureau of Mines, Okla., Bartlesville Energy Research Center, RI 8010, 39p., 1975. 19 refs.*

The performance of commercially available portable instrumentation for the detection of airborne nitrogen dioxide, sulfur dioxide, and hydrogen sulfide was evaluated in test atmospheres simulating work conditions in the mining and mineral industries. Several length-of-stain detector tubes were evaluated in atmospheres with 50 and 80% relative humidities at 75 F for test gas concentrations of 0.1, 0.25, 0.50, 1.0, 1.5, and 2.0 times the threshold limit values. Changes in the illumination of the tube from room light (fluorescent) to miner s cap lamp did not significantly affect the observer s readings of the length of stain. Humidity influenced the indicated toxic gas concentration to some extent for all of the length-of-stain tubes evaluated, with the width of the 95% confidence limit for detector accuracy generally increasing with increases in humidity. The main difference or inconsistency in toxic gas concentrations determined with various tubes resulted from observers interpretations of results, rather than from predominant differences in the tubes. (Author abstract modified)

49891 **APTIC NO. 71668**

Castle, G. S. Peter

MEASUREMENT OF SO2 CONCENTRATION IN FLUE GASES USING IONIZATION TECHNIQUES. *IEEE (Inst. Electron. Engrs.) Trans. Ind. Appl., IA-11(1):125-130, Jan./Feb. 1975. 9 refs. (Presented at the Institute of Electrical and Electronics Engineers Industry Applications Society, Annual Meeting, 7th, Philadelphia, Pa., Oct. 9-12, 1972, Paper TOD-74-23.)*

The measurement of the sulfur dioxide concentration in flue gases using ionization techniques is described. Sulfur dioxide gas has a very strong affinity for free electrons which enables the SO2 concentration to be related to the current flowing in a specially designed ionization chamber that may use either a corona or a radioactive emitter as the ionization source. When used in a differential mode, it is possible to separate interfering effects caused by the board range of variables encountered in flue gas such as temperature, gas composition, and fly ash. Excellent sensitivity is obtained in the crucial concentration range of less than 1500 ppm SO2. The instrument should be ideally suited to direct monitoring of flue gases. (Author abstract modified)

49892 **APTIC NO. 72221**

Cheney, James L. and James B. Homolya

A SYSTEMATIC APPROACH FOR THE EVALUATION OF TRIETHANOLAMINE AS A POSSIBLE SULFUR DIOXIDE SORPTION DETECTOR COATING. *Anal. Letters, 8(3):175-193, 1975. 11 refs.*

Triethanolamine was evaluated as a potential crystal coating for the sorption detection of sulfur dioxide. When coated with an absorbing compound, a quartz crystal undergoes a subsequent frequency change that indicates the sorption of a chemical species by the coating. The resulting change in crystal vibrating frequency can be used to electronically measure the mass change on its surface and thus forms the basis for a potential sulfur dioxide detector. Isothermal adsorption-desorption curves were determined for SO2 concentrations between 25 and 761 ppm to evaluate the effects of SO2 concentration versus time. Concentrations of 100 ppm SO2 and greater gave 95% response in less than 3 min. As the concentration of SO2 increased, however, a severe loss of sensitivity occurred. The most severe limitation of the potential SO2 detection scheme appears to be stability of the coating due to its evaporation at higher temperatures and higher flow rates. The prospect of using such a detector as a means of monitoring a diluted stack gas or ambient air appears promising if the above difficulties are overcome.

49893 **APTIC NO. 72088**

De Wiest, F., D. Rondia, and H. Della Fiorentina

ESTIMATION OF ATMOSPHERIC BENZO(A)PYRENE USING FLUORIMETRY COUPLED WITH LIQUID SCINTILLATION SPECTROMETRY. *(Dosage du benzo(a)pyrene atmospherique par couplage des techniques fluorimetrique et spectrophotometrique a scintillation liquide). Text in French. J. Chromatog., vol 104:399-407, 1975. 12 refs.*

Radioactive benzo(3-4)pyrene tracer and liquid scintillation spectrometry were employed to study the recovery of atmospheric samples of the carcinogen as a function of sample size. Recovery became poorer and less reproducible as the size of sample decreased to less than 1 microgram of benzo(3-4)pyrene. Coupling fluorimetry with liquid scintillation spectrometry resulted in a reduction in this source of error.

49894 **APTIC NO. 71812**

Ederhof, A. and G. Dibelius

SCATTERING LIGHT PROBE FOR DETERMINATION OF DROPLET SIZE AND HUMIDITY IN TWO-PHASE FLOWS (STEAM PIPES OF NUCLEAR POWER PLANTS, LOW-PRESSURE STEAM TURBINES, COOLING TOWERS). *(Streulichtsonde zur Bestimmung von Tropfengroesse und Feuchte in Zweiphasenstroemungen (Dampfleitung Kernkraftwerke, Niederdruckdampfturbinen, Kuehltuerme)). Text in German. VGB Kraftwerkstechnik, 55(1):61-66, 1975. 3 refs.*

The design, operation and uses of scattering light probes for the determination of droplet size and humidity in two-phase flows in steam pipes of nuclear power plants, low-pressure steam turbines, and cooling towers are described. The scattering light probe uses a light source with optical system in which the presence of a particle within the beam results in light scattering whose intensity is in proportion to the size of the particle. Observation is at a constant angle of 90 degrees. The light pulses are converted into electric impulses in a photomultiplier, and the pulses are recorded by means of oscillograph and pulse height analyzer. The coincidence of two or more particles is excluded by the use of a reduced optical volume. The speed of the particle can be determined from its residence time within the light beam. Such light scattering probes can be used for the determination of the humidity content of steam, for the assessment of precipitation and solar light extinction by cooling tower emissions, and of the efficiency of droplet separators.

49895 **APTIC NO. 71779**

Johns, Richard H. and John K. Taylor

REFERENCE MATERIALS FOR COLLABORATIVE TESTS OF AIR QUALITY METHODS. *Natl. Bur. Std. (U. S.) Tech. Note, no. 840:1-14, 1975 (?). 6 refs.*

The development of reference materials and spiking procedures for seven ambient air contaminants and two smokestack contaminants is described as part of a program to establish a reference base for collaborative tests of American Society for Testing and Materials procedures. Live, on-stream spiked ambient samples were provided for nitrogen dioxide, sulfur dioxide, and ozone; while measurements of sulfation, dustfall, airborne particulates (tape sampler), and atmospheric lead (particulate and vapor) necessitated the spiking of collected samples. The development of reference standards for stack monitoring of nitric oxide and sulfur dioxide was accomplished by piping a portion of the effluent from a small pilot plant to an adjoining laboratory. A gaseous spike was added to one of two branches of the piped effluent at a flow rate controlled by calibrated metering orifices. Details concerning the generation of each of the standards are provided along with calibration data for the instrumentation employed.

49896 **APTIC NO. 71759**

Keneko, Teruo

GAS EXTRACTOR. *(Gasu chushutsuki). Text in Japanese. (Fuji Electric Machinery Manufacturing Co., Ltd., Kawasaki (Japan)) Japan Model Util. Sho 50-4384, 3p., Feb. 5, 1975. 2 refs. (Appl. Sept. 16, 1969).*

A device for the sampling of stack gases is described. A leak-proof sleeve (guide tube) is provided for penetrating the stack. The sleeve encloses a double walled sampling tube (where the inner tube is a blowback tube) filtered to exclude dust. The sampler is so provided that the sample gas exits from the top and condensed material drains out the bottom. Provision is made to blow compressed air back through the blowback tube of the sampling tube in order to clean accumulated dust from the filter. The main advantage of this device over previous devices is that the filter can be cleaned without removing the device from the stack.

49897 **APTIC NO. 72310**

Karmarkar, K. H. and G. G. Guilbault

THE DETECTION OF AMMONIA AND NITROGEN DIOXIDE AT THE PARTS PER BILLION LEVEL WITH COATED PIEZOELECTRIC CRYSTAL DETECTORS. *Anal. Chim. Acta, vol 75:111-117, 1975. 8 refs.*

The substrates Ucon 75-H-90,000 and Ucon-LB-300X were tested as crystal coatings for the piezoelectric detection of nitrogen dioxide and ammonia. The crystals used were 9 megahertz AT cut quartz crystals with silver-plated metal electrodes on both sides, and the oscillator employed was a low frequency transistorized type. Both substrates showed sensitivity to ammonia and nitrogen dioxide only after an exposure to nitrogen dioxide for about 5 min, suggesting that the latter reacts with Ucon coatings to form a new compound on the crystal. Calibration plots for ammonia and nitrogen dioxide on the two Ucon substrates were fairly linear between 1 ppb and 1 ppm for both coatings. The principal drawback of the piezoelectric crystal detection scheme was its sensitivity to atmospheric moisture. High concentrations of organic pollutants also caused interference.

49898 **APTIC NO. 72207**

Leschonski, Kurt, Wulf Alex, and Bernd Koglin

ON-LINE MEASUREMENT METHODS FOR PARTICLE SIZE ANALYSES. *(On-line-Messverfahren der Teilchengroessenanalyse). Text in German. Chem.-Ing-Tech., 47(3):97-100, 1975. 25 refs.*

The suitability of existing particle size analytical methods for on-line measurements was studied. On-line measurement of the particle size requires relatively large samples, and the principle of measurement should permit rapid analysis. Particle counting methods are suitable for on-line measurement only exceptionally due to the particle concentration being limited. Flow separation methods are most suited for the measurement of the size distribution of particles in air and liquids. Sorption methods are not applicable as they are inherently batch processes.

49899 **APTIC NO. 71669**

Moore, Gerald E. and Suresh P. Babu

RAPID DETERMINATION OF COAL CHAR OXIDATIVE REACTIVITY. *Fuel, vol. 54:24-28, Jan. 1975. 7 refs.*

A semi-quantitative comparison of the reactivity of carbon samples to oxidative gases was made using a rapid quantitative estimation of carbon dioxide by infrared spectrophotometry. The previously demonstrated inverse relation between the ease of wet oxidation of carbon samples and their reactivity to oxidizing gases was confirmed. Wet oxidation characteristics of Montana lignite char, FMC bituminous coal char, and electrode carbon were tested. The effect of particle size, carbon content, and potassium oxide as a catalyst were investigated. Potassium oxide inhibits the wet oxidation of Montana lignite char which extends the inverse relation for uncatalyzed samples. This method can provide the basis for choice between alternative char samples either for complete gasification or combustion. (Author abstract modified)

49900 **APTIC NO. 72348**

Morimoto, S.

GAS CHROMATOGRAPHIC ANALYSIS OF AIR POLLUTANTS. *(Gasu kuromatogurafu ni yoru kankyo osenbushitsu no bensekiho). Text in Japanese. Idemitsu Sekiyu Gijutsu (Idemitsu Pet. J.), 18(1):18-41, 1975. 27 refs.*

The gas chromatographic method with high sensitivity and selectivity is widely used for the analysis of environmental pollutants. As detectors, flame ionization detectors, flame photometric detectors, electron capture detectors (ECD), FTD and others are described with characteristics of each and schematic diagrams. As for column packing materials, the lists of commercially available stationary liquid phase material and solids coated with nonvolatile stationary liquid are given in tabular form. The general analysis procedures for microamounts of malodorants, aldehyde in automotive exhaust gas, polycyclic aromatic hydrocarbons, benzopyrene in suspended particulates, peroxyacyl nitrate, polychlorinated biphenyls, alkylmercury compounds, cyanides, and agricultural chemicals are described with sampling methods and equipment, measurement conditions, data, and evaluation method of data. Gas chromatography is used not only for organic compounds but also inorganic compounds and metal complexes.

49901 **APTIC NO. 72223**

Ortiz, Lawrence W., Harry J. Ettinger, and Charles I. Fairchild

CALIBRATION STANDARDS FOR COUNTING ASBESTOS. *Am. Ind. Hyg. Assoc. J., 1975:104-112, Feb. 1975. 8 refs.*

A dispersion-filtration technique for preparing calibration standards to be used in conjunction with a standard microscopic asbestos fiber counting method is described. Multiple membrane filter samples containing identical and predictable concentrations of asbestos fibers with consistent particulate backgrounds are prepared. A technique of filtering liquid (toluene) suspensions is used to provide chrysotile asbestos standards ranging from 200-1500 fibers/sq mm of filter area with an aluminum oxide particulate background. Extensive replicate fiber counting was performed to evaluate variations inherent in preparing the identical samples and to estimate variations between different counting personnel. Count data obtained from several counters at a single facility indicate that the liquid suspension filtration technique provides reproducible asbestos standards as measured by optical microscopy with a coefficient of variation of + or - 20% and individual variations of + or - 50%. Minimum errors inherent in the standard fiber counting technique were quantified and indicate that fiber counting by optical microscopy underestimates the measure of human exposure to asbestos dust since all variables in the technique tend to reduce the number of fibers counted. (Author abstract modified)

49902 **APTIC NO. 71814**

Prietsch, W., C. Alter, and M. Naumann

THE OXIDES OF NITROGEN MEASUREMENT AT EXHAUST GASES OF COMBUSTION ENGINES. *(Die Stickoxidmessung bei Abgasen von Verbrennungsmotoren). Text in German. Technik (Berlin), 30(1): 43-48, 1975. 29 refs.*

Chemical and physical methods available for the determination of nitrogen oxides were tested and compared with respect to their suitability for spark-ignition and diesel engine exhaust oxides of nitrogen analysis. Of all methods tested (Saltzman's method, phenoldisulfonic acid method, as well as non-dispersive infrared, ultraviolet absorption, and chemiluminescence methods), the chemiluminescence method was best for the determination of the total nitrogen oxides concentration in vehicle exhaust, even though the nitrogen dioxide conversion is still problematic, and the NO2 concentrations lies within the dispersion limits of the nitric oxide analyzer. Measurement of NO is possible by the NDIR method provided the cross-sensitivity for water is simultaneously measured, and adequate correction is used. The Saltzman method is preferable to the phenoldisulfonic acid method under stationary analytical conditions due to its simplicity and reliability. For a concentration range of 100-1000 ppm, a Saltzman factor of 0.72 is best for exhaust nitrogen oxides analysis.

49903 **APTIC NO. 72282**

Schulte, K. A., D. J. Larsen, R. W. Hornung, and J. V. Crable

ANALYTICAL METHODS USED IN A STUDY OF COKE OVEN EFFLUENT. *Am. Ind. Hyg. Assoc. J., 1975:131-139, Feb. 1975. 18 refs.*

Selected chemical analyses of airborne particulates, vapors, and metals in the emissions from five coke ovens were performed to assess the extent of occupational exposure to polynuclear aromatic hydrocarbons and to evaluate various sampling and analytical methods for coke oven emissions. The area sampling methods used included a Dorr Oliver cyclone, a British Cast Iron Research Association aluminum alloy cyclone, a gross glass fiber filter, a gross silver filter, a horizontal elutriator, a charcoal tube, and a high-volume glass fiber filter. Personal monitors were also employed. The analytical techniques tested included: a benzene soluble extract method; gas, liquid, and thin-layer chromatography; a spectrophotometric emission index; and atomic absorption spectrometry. The benzene soluble fraction of coal tar pitch volatiles, upon which the present standard for exposure to coke oven emissions is based, did not correlate well for all sampling techniques with any of the tested analytical methods for polynuclear aromatics. The lack of correlation requires that epidemiological studies be conducted to determine if polynuclear aromatics are a good index of the hazards of exposure to coal tar pitch volatiles. Since the benzene soluble method is non-specific and involves problems in its procedure, it is desirable to find a new analytical method for assessing coal tar pitch exposures.

49904 **APTIC NO. 71709**

Seki, Yukio and Yoko Ichikawa

APPLICATION OF GAS CHROMATOGRAPHY FOR INDUSTRIAL HYGIENIC STUDY. *(Rodo eisei bynua ni okeru gasu kuromato gurafi no oyo). Text in Japanese. Rodo Eisei (Japan. J. Ind. Hyg.), 16(2):56-61, Feb. 1975. 3 refs.*

Gas chromatography is one of the best analyzers for air samples in work rooms which use organic solvents, such as paint factories. The permissible levels of common organic solvents in work rooms are 200, 200, 50, 400, 200, 10, 100, 150, 100, and 100 ppm for acetone, methanol, butanol, ethyl acetate, butyl acetate, benzene, toluene, xylene, methyl isobutyl ketone, and n-hexane respectively. These compounds can be determined by a 2-meter stainless steel column filled with polyethylene glycol 600 (5% on 60/80 mesh Fujiichrom). The principles of gas chromatography are explained.

49905 **APTIC NO. 72204**

Sommer, K.

THE INFLUENCE OF SAMPLING VOLUME ON THE AVERAGE ERROR OF GRAIN SIZE ANALYSES. *(Einfluss des Probenvolumens auf den mittleren Fehler der Korngroessenanlyse). Text in German. Chem.-Ing.-Tech., 47(3):95-96, 1975. 6 refs.*

Formulas for the calculation of the variance in grain size analysis of discrete and continuous distributions are presented for the determination of the influence of the sample volume on the mean error of the grain size analysis. The formulas permit the determination of the mean error of the sampling for known volume sum distribution and given sample volume. The mean error decreases with the increase of the sample volume, and with the decrease of the maximum grain volume. The formulas derived are also suitable for the calculation of the necessary sample volume for given mean error.

49906 **APTIC NO. 71788**

Yoshida, Tetsuo, Yasuo Kousaka, and Kikuo Okuyama

A NEW TECHNIQUE OF PARTICLE SIZE ANALYSIS OF AEROSOLS AND FINE POWDERS USING AN ULTRAMICROSCOPE. *Ind. Eng. Chem., Fundamentals, 14(1):47-51, 1975. 7 refs. (Presented at the Chemical Engineering Meeting, Japan.)*

A technique for the particle size analysis of fine powders and aerosols, including those of fine liquid droplets, is described. The technique, which in principle is similar to the Andreasen pipet method, has the following distinctice features: sedimentation is made in air as well as in water according to the particle size, sedimentation depth is extremely shallow, and particle concentration at a given depth in a sedimentation cell is detected by an ultramicroscope on a number basis. Sedimentation in air or water with shallow sedimentation lengths (0.5 to a few millimeters) permits rapid measurement even for submicron particles. Particles appearing in the microscope are photographed or recorded by a video recorder as sedimentation continues until the particles disappear from sight. Particle concentrations must be high (greater than 4 million/cu cm for 0.2 micron particles), and repeated observations must be made until a sufficiently large number is obtained. The particle size limits of the method extend from several tenths of a micron to more than several tens of micron. (Author abstract modified)

1974

49907 **APTIC NO. 69575**

Alkezweeny, A. J.

AIRBORNE LABORATORY FOR AIR POLLUTION STUDY. *In: Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research. Part 3. Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Atomic Energy Commission Contract AT (45-1):1830, p. 87-93, April 1974.*

NTIS: BNWL-1850 PT3

A Cessna 411 aircraft equipped with an air pollution measurement laboratory is described. The aircraft is capable of altitudes of up to 25,000 ft. Instrumentation capabilities include the continuous measurement and recording of aerosol particle size distributions (0.001-5 micron), Aitken nuclei concentrations, cloud condensation nuclei and ice nuclei concentrations, and sulfur dioxide and nitrogen oxide concentrations. Sulfur dioxide concentrations are determined electrochemically, and nitrogen oxides are measured with a chemiluminescent monitor. Instrumentation is also provided for measuring meteorological and aircraft parameters. All of the data are measured and recorded automatically on magnetic tape and/or strip-chart recorders. The magnetic tapes are brought to a computer facility for further processing and analysis. (Author abstract modified)

49908 **APTIC NO. 71592**

Amaya, K.

THE MINI SAMPLER ELIMINATING THE INFLUENCE OF WIND. *(Kaze no eikyo o torinozoita kogata hoshukan). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):193, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974.)*

Mini samplers made by inserting pre-impregnated filter paper into capped plastic tubes have the advantages of simple sampling and operation with no power required and of simple maintenance. Measurements of nitrogen dioxide with mini sampler containing filter paper impregnated with 50% triethanolamine aqueous solution revealed that standard deviations varied with the direction of the sampler tube. Smallest standard deviations were obtained with the tube mouth pointing to the ground. The effect of wind velocity was studied by placing the sampling tube in a holder doubly wrapped with nylon net. At high wind velocity the difference between the results with and without the holder was much greater. Further study is necessary to prove the positive role of the nylon-wrapped holder.

49909 **APTIC NO. 72098**

Amaya, K.

SIMPLE EXPERIMENTAL APPARATUS FOR DIFFUSION OF AIR POLLUTANTS. *(Kaki kakusan mokei to sorenmyoru ikutsu kano jikken). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):307, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 162.)*

A simple apparatus was contructed by placing filter paper impregnated by a coloring agent at the bottom of a box. The color develops when volatile substances diffuse on the filter paper. Examples of coloring agent-volatile substance combina tions are hydrochloric acid-alkali indicator, ammonia-acid-alkali, hydrogen peroxide-potassium iodide-starch, bromine-KI-starch, iodide-KI-starch, and fuming nitric acid-Saltzman reagent. Quantitative analysis is done by comparing the capture concentration and the original concentration of the volatile substance at the emission source.

49910 **APTIC NO. 71635**

Aoyama, Hyogoro

MEASURING TECHNIQUES OF NITROGEN OXIDES IN AUTOMOBILE EXHAUST GASES. *(Jidosha haishutsu gas no chisso sanka-butsu sokutei gijutsu). Text in Japanese. (Sangyo Kogai Boshi Gijutsu (Ind. Pollut. Control Tech.), 1974:74-82, June 1974. 12 refs.*

Important analyzers for nitrogen oxides are the nondispersive infrared analyzer (NDIR), the nondispersive ultraviolet analyzer (GDUV), and the chemiluminescence NO/NOx analyzer (GLD). The NDIR is very rapid in response with wide measurement range. Therefore, it is suited for the continuous determination of NOx in automobile exhaust gases. The GDUV makes use of the strong absorption of ultraviolet rays of 320-500 millimicron by nitrogen dioxide. The absorption is not interfered with by the presence of moisture. It is usual practive to determine nitric oxide with NDIR and NO2 with the NDUV and the sum of the data is taken as the content of NOx. The GLD was developed to eliminate the faults that accompany the NDIR and NDUV. Problems that remain to be solved are the method of sampling, the elimination of the effects of the atmosphere, and the method of calibration of the analyzers. For example, NOx discharged from the automobiles is present as NO in the neighborhood of the exhaust tubes. However, NO changes into NO2 with time and forms N. This NO2 is so active that it reacts with the parts of the measuring instruments or with other substances causing an error in the determination.

49911 **APTIC NO. 71675**

Ball, Herbert and Friedhelm Mueller

ON-LINE CHROMATOGRAPH FOR THE SELECTIVE MEASUREMENT OF HYDROCARBONS WITHIN THE FRAMEWORK OF ENVIRONMENTAL PROTECTION. *(Prozesschromatograph zum selektiven Messen von Kohlenwasserstoffen im Rahmen des Umweltschutzes). Text in German. Siemens Z., 48(9):622-625, Sept 1974.*

An automatic chromatograph for the selective analysis of hydrocarbons in the air is described. The air to be analyzed is sampled in an adsorber column cooled to -30 C, after which the residual gases and air are expelled with nitrogen and the captured hydrocarbons are desorbed by heating. The desorbed hydrocarbons are chromatographically separated, analyzed, and recorded by the gas chromatograph. The chromatograph can be controlled by computer and is suitable for use in laboratories and in mobile testing units alike. The lowest measurement range is between zero and 10 ppb, while the lowest limit of detectability is 0.5 ppb.

49912 **APTIC NO. 75101**

Barrett, William J. and Herbert C. Miller

DEVELOPMENT OF A SAMPLING METHOD FOR TOTAL ATMOSPHERIC SELENIUM (FINAL REPORT). *Southern Research Inst., Birmingham, Ala., Engineering and Applied Sciences Dept., Environmental Protection Agency Contract 68-02-1220, Proj. 3128 - XIII, Program Element 1AA010, Task 19, ROAP 26ACX, Rept. EPA 650/2-74-124, SORI-EAS-74- 353, 47p., Dec. 1974, 34 refs.*

Sampling and analytical techniques were established for the determination of total atmospheric selenium. Retentive filters were used to collect particulate material containing selenium, and chemically treated filters were evaluated for the collection of gaseous selenium. The 2,3-diaminonaphthalene fluorometric method was established as thy primary analytical technique for determining selenium. Selenium appeared to be present in ambient air predominantly in particulate form; thus conventional particulate sampling suffices to collect the bulk of atmospheric selenium. The most probable chemical forms of atmospheric selenium appeared to be the element and the dioxide (selenite).

49913 **APTIC NO. 71558**

Beckwith, George S.

PARTICULATE SAMPLING WITH A COMPACT INTERMEDIATE VOLUME SAMPLER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., Pacific Northwest International Section, 35p., 1974. 23 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 17-19, 1974.)*

A portable, lightweight, intermediate-volume sampler for measuring the mass concentration of particulates in stacks is described. The filter housing of the sampler consists of a smooth transition inlet and outlet bell which facilitates even flow distribution over the filter area and minimal material deposit on the housing. An active filter area of 20 sq in. is provided. A high temperature O-ring seal controls external leakage. Sampling nozzle inlet diameters permit the sampler to operate within the 4-29 cu ft/min sampling range, with resulting nozzle inflow velocities matching the 10-100 fps velocities normally encountered in stacks. The flowmeter portion has a wedge-shaped pitot flow sensing head and is readable down to a flow rate of about 3 cfm. The sampler s blower and speed control allows sampled gas to escape without passing through the motor. Field test measurements with the sampler demonstrate a 94% correlation with standard methods.

49914 **APTIC NO. 72069**

Bignardi, Luigi

DEVICE FOR MEASURING THE OPACITY OF SMOKES. *(SNAM PROGETTI, S.p.A., San Donato, Milanese (Italy)) U. S. Pat. 3,816,004. 4p., June 11, 1974. 3 refs. (Appl. May 26, 1972, 2 claims).*

A photoelectric device for measuring smoke opacity in vehicle exhaust streams is described that overcomes prior-art limitations involving mechanical and thermal fragility, insufficient measuring field capacity, and measurement alterations. An optical system consisting of a light source, a condenser system, and a diaphragm is arranged to pass a luminous beam first to a semi-reflecting mirror and then to a reflecting mirror. The luminous beam is reflected back along the initial path to the semi-reflecting mirror and is then reflected along a second path onto a photoelement. A venturi tube is positoned in an outlet chamber orthogonally to the first light path for passing gases through the luminous beam. The venturi tube has its narrowest section (not less than 100 mm in diameter) coincident with the first light path. The semi-reflecting mirror is inclined at an angle of about 45 deg relative to the luminous beam. An infrared filter is located in front of the photoelectric element along the second light path.

49915 **APTIC NO. 75058**

Burch, D. E. and D. A. Gryvnak

INFRARED GAS FILTER CORRELATION INSTRUMENT FOR IN-SITU MEASUREMENT OF GASEOUS POLLUTANTS (FINAL REPORT). *Philco Ford Corp., Newport Beach, Calif., Aeronutronic Div., Environmental Protection Agency Contract 68-02-0575, Program Element 1AA010, Work Unit 14, ROAP 26AAP, Rept. EPA-650/2-74-094, Rept. U6121, 64p., Dec. 1974. 15 refs.*

NTIS: PB 239467/AS

An infrared gas filter correlation instrument for measuring the concentrations of carbon monoxide, nitric oxide, sulfur dioxide, hydrogen chloride, and hydrogen fluoride in the effluent of stationary sources is described. An infrared beam is directed across the stack to a retroreflector and back so that the instantaneous average concentration is measured continuously without disturbing the constituents of the effluent. A small, removable, fixed-position grating monochromator acts as a unique optical filter that passes narrow spectral intervals that are centered at wavelengths where the gas to be detected absorbs. One grating monochromator is used for CO and NO, another for SO2 and HCl, and a third for HF. The useful ranges of concentration times path length, in atm cm, over which the gas can be measured are: 0.005-0.04 for NO; 0.0013-0.15 for CO; 0.001-4.0 for SO2; 0.0003-0.2 for HCl; and 0.0001-0.02 for HF. Discrimination against other gases in the effluent is excellent. Field tests of the instrument on the smokestack of a coal-burning power plant were satisfactory. Minor problems encountered included: the accumulation of dirt on the windows, binding of the window shutters, and difficulties in changing the detector without exposing it to the sunlight. (Author abstract modified)

49916 **APTIC NO. 72236**

Capuano, Italo A.

AUTOMATIC MERCURY MONITOR. *(Ionics, Inc., Watertown, Mass.) U. S. Pat. 3,826,618. 7p., July 30, 1974. 4 refs. (Appl. July 10, 1972, 10 claims).*

A method and apparatus for the continuous automatic analysis of gas streams for their ionic, elemental, and organic mercury content even in the presence of other contaminants such as chlorine or organic matter is described. The sample is first pyrolyzed and then automatically measured and treated with an aqueous reducing reagent. The resulting elemental mercury is then transferred to a photometric detector, and the results are recorded automatically. The reducing reagent consists of aqueous stannous chloride and aqueous hydrazine. The sample flow rate is not critical between about 0.1 and 10 l/min using a reagent volume of between 10-100 ml. The detector is zeroed using aqueous reducing reagent and mercury-free air.

49917 **APTIC NO. 72386**

Chaigneau, M. and M. Santarromana

BIBLIOGRAPHY OF THE DETERMINATION OF HYDROGEN SULFIDE, SULFUR DIOXIDE, AND THEIR MIXTURES. *(Mise au point bibliographique sur les dosages de H2S, SO2 et de leurs melanges). Text in French. Rev. Inst. Franc. Petrole, 29(5):697-713, Sept.-Oct. 1974. 332 refs.*

Methods available for the separate and joint determination of hydrogen sulfide and sulfur dioxide are reviewed, and a related bibliography comprising 332 entries is presented. Hydrogen sulfide can be adsorbed from air by activated carbon, nickel, or potassium benzosulfonate for subsequent gas-chromatographic determination, or on salts of copper, silver, and lead for volumetric, gravimetric, or colorimetric determination. Turbidimetric, polarographic, potentiometric, coulometric and diffractometric determination is also possible. Sulfur dioxide can be determined by acidimetric, spectrophotometric, gas-chromatographic, emission spectrometric, flame-photometric, radiochemical, polarographic, amperometric, and coulometric methods.

49918 **APTIC NO. 71530**

Chu, William P.

COHERENT OPTICAL INSTRUMENTATION FOR MEASUREMENTS OF PARTICLE PARAMETERS (FINAL TECHNICAL REPORT). *Old Dominion Univ. Research Foundation, Norfolk, Va., National Aeronautics and Space Administration Research Grant NGR 47-003-088, NASA-CR-140446, N-74-34192, 19p., Oct. 1974. 4 refs.*

Theoretical calculations and visibility measurements with glass particles were performed to investigate the application of a cross-beam laser doppler velocimeter for the sizing of small particles. The theoretical calculations which were based on both scalar diffraction theory and exact Mie scattering theory indicated that the forward scattering characteristics of a small particle in a cross-beam LDV system can be used for particle sizing. The effects due to the index of refraction appeared to be small provided the cross-beam angle is small. Both scalar diffraction theory and Mie scattering predicted similar scattering characteristics with varying receiver aperture size. Measurements of visibility functions for different frine spacing, different particle sizes, and different receiving cone angles are provided.

49919 **APTIC NO. 71943**

Chuan, R. L.

THE CELESCO QCM CASCADE--RECENT TEST RESULTS WITH AN ACTIVE CASCADE SYSTEM. *Preprint, 13p., Dec. 1974.*

The operation and application of the Celesco QCM Cascade impactor are described. The instrument combines the technique of particulate matter sizing by inertial impaction and the technique of quartz crystal microbalance. Particles are separated by a parameter based on their geometry and mass density. The instrument was used to monitor contamination during the flight of Skylab and can be used to measure air pollutants. Data are presented on sample measurements of particulate size distribution in the atmosphere taken with a Celesco 6-stage QCM cascade system. The time of day, brief description of atmospheric conditions, total particulate mass concentration, and mass-mean-diameter are noted. At a total concentration of 50 micrograms/cu m, five successive 2-minute scans were sufficient to give good accuracy. At total concentrations above 100 micrograms/cu m a single 2-minute scan was sufficient.

49920 **APTIC NO. 71557**

Crocker, Burton B.

MONITORING EFFLUENT PARTICULATE EMISSIONS BY STACK OPACITY. *Preprint, American Inst. of Chemical Engineers, New York, 28p., 1974. 9 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 78th, Salt Lake City, Utah, Aug. 19-21, 1974, Paper 46d.)*

Ensor and Pilat have developed theoretical methods for predicting plume opacity for the concentration and properties of the particulates in the plume. The reliability of these methods is imporved if constants experimentally determined from the effluent are used rather than theoretical values. Development of a calibration curve between stack opacity and particle concentration can be used as a technique for contiguously monitoring process effluent without resorting to continuous particulate sampling. It is also helpful in estimating emissions from a series of stacks on identical lines of equipment where the cost of sampling platforms on all stacks would be costly. A modified equation is suggested for correlating data where opacity is close to zero rather than the theoretical equation. Problems in obtaining good correlations as affected by opacity measurements and sampling technique are discussed. Use of the correlation technique is illustrated with data from a low temperature coal carbonization process. Preliminary data relating opacity and sulfur trioxide concentrations in moist stacks are also presented. (Author abstract)

49921 **APTIC NO. 75063**

Derr, V. E., M. H. Ackley, M. J. Post, and R. F. Calfee

REMOTE SENSING OF POLLUTANTS: COMPUTERIZED REDUCTION OF LONG-PATH ABSORPTION DATA (FINAL REPORT). *National Oceanic and Atmospheric Administration, Boulder, Colo., Wave Propagation Lab., Environmental Protection Agency Interagency Agreement-077 (D), Program Element 1AA010, ROAP, 26AAP, Rept. EPA-650/2-74-113, 200p., July 1974. 24 refs.*

NTIS: PB 240168/AS

The use of a digital computer program for determining concentrations of atmospheric gases remotely sensed by long-path infrared spectrophotometry is described. The measurement of the concentration of each gas from the complex spectrum obtained requires the fitting of trial spectra composed from a spectral library. The fitting procedure adjusts the concentrations of the trial spectra until a best fit in a least squares sense is produced. The spectral library must be accurate in wavelength, pressure and temperature broadening parameters, and spectral line or band intensity; and the spectrophotometer used to obtain the field data must match the resolution of the spectra in the library. Detailed instructions for the computer program and a library of spectra for such gases as methane, water vapor, sulfur dioxide, carbon monoxide, carbon dioxide, nitrous oxide, ozone, and nitric acid vapor are presented.

49922 **APTIC NO. 72054**

Fujitani, Yoshio, Kazuo Ota, and Ryo Tomita

SOME INVESTIGATIONS OF OXIDANT MEASUREMENT. *(Taikichu okishidanto bunsekiho no kento). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):185, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 37.)*

Ozone sampling loss and correction factors for nitric oxide and nitrogen dioxide in an oxidant meter are examined. The ozone sampling loss is studied using Teflon, glass, stainless steel, Tygon, and polyethylene tubes, plus a chromium trioxide scrubber. The Teflon tube with dust gave 40% ozone sampling loss; however, there was no ozone loss with a 20-meter clean Teflon tube, even with the presence of some moisture. Both glass tube and chromium trioxide scrubber worked satisfactorily without any effects from moisture content. The other three materials unacceptable for ozone sampling because of the large ozone loss. A standard nitric oxide or nitrogen dioxide gas was first analyzed by a nitrogen oxides analyzer, and then by a Beckman 2050 oxidant meter. The NO and NO2 correction factors are defined as the ratio between NO readings by oxidant meter and NOx analyzer. The factors were independent of both gas concentration and humidity, and they were both 0.14. The correction factor varied between the analytical instruments involved, and therefore similar correction must be made for each combination of analyzers. With the present instrumentation, the ozone concentration can be obtained by calculating the oxidant meter reading minus 0.14 times the NO and NO2 concentrations obtained by the NOx analyzers.

49923 **APTIC NO. 71634**

Futsuhara, Natsuko

MEASURING TECHNIQUES OF MINUTE AMOUNTS OF NOX PRESENT IN THE ATMOSPHERE. *(Taiki-chu no biryo NOx sokutei gijutsu). Text in Japanese. Sangyo Kogai Boshi Gijutsu. (Ind. Pollut. Control Tech.), 1974:83-90, June 1974. 4 refs.*

A comparison was made between the chemiluminescence measuring method for nitrogen oxides and the automatic Saltzman analyzer method. The reaction between nitric oxide and ozone is allowed to proceed in reduced pressure or under ordinary pressure. The light emitted by the progress of the reaction is detected with a photoelectron multiplier and used to determine the NO concentration. Nitrogen dioxide is converted into NO before determination. This method is quick in response and highly sensitive. Also, the experimental data are little affected by the presence of various gases usually present in the ambient atmosphere. The Saltzman method makes use of the coloration of sulfanyl acid or N-(1-naphthyl)ethylenediamine by nitrite ion, which is formed by the reaction between water and NO2. By this method, NO is converted to NO2 by oxidation with potassium permanganate if NO is to be determined. The disadvantage of this method is that the data are not available until at least 1 hour after the determination. The permeation membrane method was examined for the preparation of standard gases to be used for the determination. This method has various advantages over the permeation tube method. The data obtained by the Saltzman method were compared with those obtained by the chemiluminescence method with the aid of the standard gases prepared by the permeation membrane method.

49924 **APTIC NO. 72245**

Gentilizza, Mirjana, Mirka Fugas, and F. Valic

THE VALUE OF STABILIZERS IN THE DETERMINATION OF SULPHUR DIOXIDE IN THE AIR. *(Vrijednost sredstava za stabilizaciju pri odredivanju atmosferskog sumporova dioksida). Text in Serbo-Croatian. Arhiv. Hig. Rada, 25(1):27-32, 1974. 5 refs.*

The efficacy of adding stabilizers (5% glycerol, 0.2% normal-butanol, and 0.5% acacia) to 0.01 molar sodium hydroxide for the collection and storage of airborne sulfur dioxide samples was investigated. Good collection efficiency was obtained for mixtures of SO2 and air prepared in the laboratory; however, poor results were obtained with realistic air samples due to the presence of nitrogen dioxide in the atmosphere. Although the stabilizers protected SO2 oxidation by oxygen, they were ineffective in preventing nitrogen dioxide-induced oxidation of SO2. Thus, the stabilizer absorption medium is not recommended for ambient air sampling.

49925 **APTIC NO. 72384**

Hargittay, Emil

DETERMINATION OF NITROUS GAS IMPURITIES BY INSTRUMENTS. *(Nitrozus gazszennyezesek muszeres meghatarozasi modszerei). Text in Hungarian. Meres Autom., 22(10):405-410, 1974. 30 refs.*

Instrumental methods available for the determination on nitric oxide and nitrogen dioxide in air, as well as their advantages and drawbacks are reviewed. Photometric, electrolytic, infrared absorption, coulometric, spectrometric, interferometric, and chemiluminescent methods are described. Photometric instruments are used commonly and widely even though they are relatively complicated, and require long measurement cycles. Electrolytic instruments require the correct knowledge of the gas being tested to rule out interferences due to other components. The IR absorption instruments require preliminary drying of the test gas due to the possible interference of water vapor. Coulometric and chemiluminescent instruments are often used for calibration due to their high accuracy. Spectrometric and interferometric instruments have been developed for the telemetric determination of nitrogen oxides in the atmosphere.

49926 **APTIC NO. 71593**

Hattori, Y., T. Ro, Y. Furukawa, and K. Unno

COMPARATIVE MEASUREMENTS OF SULFUR OXIDE. *(Io sankabutsu no sokuteiho no hikaku kento ni tsuite (shitsunai kankyo ni okeru teinodo sokutei no baai)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):186, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974.)*

Measurements of low concentrations of indoor sulfur oxides by the solution conductivity method (AP meter) and the pararosaniline method were compared. At SOx concentration below 0.02 ppm, results obtained by AP meter showed higher values as compared to those by the pararosaniline method. The opposite was true when the concentration was higher than 0.02 ppm. The same trend was found when an oxalic acid column was used in the AP method to remove ammonia. No apparent effect of the oxalic acid column was found on the pararosaniline method.

49927 **APTIC NO. 71543**

Hess, R. V. and R. K. Seals, Jr.

APPLICATIONS OF TUNABLE HIGH ENERGY/PRESSURE PULSED LASERS TO ATMOSPHERIC TRANSMISSION AND REMOTE SENSING. *National Aeronautics and Space Administration, Hampton, Va.,* Langley Research Center, Technical Memorandum TMX-72010, 16p., Sept. 1974. 17 refs.

NTIS: N74-32939

Applications of tunable high energy/pressure pulsed carbon dioxide lasers to atmospheric transmission and remote sensing of air pollutants are discussed. The requirement for laser tuning range in laser differential absorption measurements varies for each pollutant, depending on the proximity of the laser lines to on and off positions for the atmospheric absorption lines. Absorption lines for pollutants such as ozone, ammonia, nitric oxide, ethylene, and sulfur dioxide require a tuning of at least 1-1.5 GHz, requiring line widths of 3 GHz corresponding to a laser pressure of equal to or greater than 1 atmosphere. Such pressures are easily achievable with pulsed high energy/pressure lasers.

49928 **APTIC NO. 69394**

Hinkley, E. D. and R. T. Ku

LONG-PATH AMBIENT-AIR MONITORING WITH TUNABLE LASERS -- PARTICIPATION IN THE ST. LOUIS REGIONAL AIR POLLUTION STUDY (RAPS) OF THE ENVIRONMENTAL PROTECTION AGENCY. *Preprint, National Science Foundation, Research Applied to National Needs, 7p., 1974. 21 refs. (Presented at the Trace Contaminants Conference, Annual, 2nd, Asilomar, Calif., Aug. 29-31, 1974.)*

The resonance absorption technique employing a tunable semiconductor diode laser was used to perform integrated-path monitoring of atmospheric pollutant gases over long distances. Recent measurements carried out in Massachusetts showed continuous laser monitoring of atmospheric carbon monoxide to have a sensitivity of a few ppb over a 0.6 km path. The laser system was incorporated into a mobile van and transported to St. Louis, Mo., to participate in the first Regional Air Pollution Study of the U. S. Environmental Protection Agency. The main purpose of the study is to evaluate various mathematical models for predicting pollutant concentrations around urban areas. Since the grid size for such models is usually of the order of 1 km, a long-path laser technique is ideal for providing the input data and checking model accuracy. In addition; pollutant variability studies will be performed at selected sites in an attempt to understand reasons for possible differences between the long-path data and those obtained from more conventional point-sampling instruments. The results of carbon monoxide measurements in Boston and St. Louis and measurement and calibration techniques are discussed. (Author abstract modified)

49929 **APTIC NO. 72238**

Honma, Katsunori

ANALYSIS OF REACTION PRODUCTS IN AEROSOL FORM AND ITS DIFFICULTIES. *(Hanno seiseibutsu to sono bunsekijo no mondaiten). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):114-122, Nov. 1974. 9 refs.*

Analysis methods for primary and secondary particulates are reviewed. As component analysis methods, X-ray diffraction and fluorescent X-ray analysis are discussed with reference to sensitivity, problems of chemical reaction between sample particulates, and other limitations. The combination of the thin metal membrane method and energy dispersive X-ray microanalyzer are described as methods for analyzing the components of individual particulates. In the thin metal membrane method, the sample particulates are placed on thin membranes of iron, copper, or silver, and the corrosion of the membrane by sample is observed by electron or optical microscope and compared to the standard. For elementary analysis of particulates, the samples are irradiated by electrons and the resulting emission of characteristic X-rays is measured by a semiconductor detector. Data obtained with electron micrographs on Aug. 10, 1973 in Kawasaki at a time of smog formation are given and evaluated.

49930 **APTIC NO. 71535**

Hurlbut, Jeffrey A. and Dale L. Bokowski

DETERMINATION OF SUBMICROGRAM AMOUNTS OF BERYLLIUM IN AIR FILTER SAMPLES BY NON-FLAME ATOMIC ABSORPTION SPECTROMETRY. *Dow Chemical Co., Golden, Colo., Environmental Sciences and Waste Control, Atomic Energy Commission Contract AT(29-1)-1106, RFP-2287, UC-41, TID-4500-R62, 12p., Dec. 31, 1974. 16 refs.*

NTIS: RFP-2287

An atomic absorption spectrometric method for the analysis of nanogram amounts of beryllium in air filter samples is described. A filter is ashed in oxidizing acids, diluted with sulfuric acid and water, and analyzed with a single-beam, non-flame atomic absorption spectrometer. Aqueous standards containing 0.9 M H2SO4 are used. The sensitivity and detection limits are 1.0 times 10 to the minus 12 g and 0.4 times 10 to the minus 12 g, respectively. A recovery of 4 ng beryllium per filter paper can be achieved with a relative accuracy of + or - 5% and a relative standard deviation of + or - 8%. The aluminum in glass filters causes a nonatomic absorption peak that interferes with the beryllium atomic absorption peak, and thus the detection is limited to about 0.1 micrograms of beryllium per glass filter. Perchloric acid and hydrofluoric acid also interfere with absorption signal and must be removed during digestion. (Author abstract modified)

49931 **APTIC NO. 72235**

Irwin, Charles P.

GAS ANALYZING APPARATUS. *(Commercial Electronics, Inc., Mountain View, Calif.) U. S. Pat. 3,826,577, 7p., July 30, 1974. 4 refs. (Appl. Dec. 7, 1972, 19 claims).*

An optical gas analyzer for monitoring the chemical composition of automotive exhaust gas is described that overcomes prior art difficulties associated with separating the radiation source and detector from the contaminating gas flow. The analyzer is defined by an open-ended tube situated concentrically about the optical path of the light radiation and a vacuum chamber disposed over the length of the tube. The vacuum chamber is outside the optical path to prevent its interference with the latter. Gas is introduced into the tube (preferably at the middle), flows parallel to the optical path to the open tube ends, and is completely withdrawn from the latter by a vacuum prevailing in the vacuum chamber. Thus the gas is unable to contact and contaminate either the radiation source or the radiation detector.

49932 **APTIC NO. 71609**

Kachi, K., N. Nakano, K. Kimura, T. Ito, H. Ito, and T. Kato

METHOD OF SAMPLING UPPER AIR BY RADIO-CONTROLLED AIRPLANE. *(Musen yudo hikoki ni yoru joku taiki no sanpuringu-ho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):218, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 75.)*

Sampling of upper air over Hachioji City, Japan, was effected with a twin-engined drone. Drone dimensions were as follows: wingspan, 2.35 m; bodylength, 1.75 m, deadweight, 6.5 kg, gross weight, 9.5 kg. Two engines, each with 1 PS, were used. Six servomechanisms regulated ailerons, rudder, elevators, engine controls, camera shutter, diaphragm pumps and sampling-switching devices. Four sampling bags (each 12 l, each filled in about 1 min) or one sampling bag (35 l; filled in about 4 min) can be used. The plane was aloft about 35 min. Altitude and temperature measurements were recorded. Samples were taken at ground level, and at altitudes of 140 m, 200 m, 420 m, 990 m and analyzed by gas chromatography. Seventeen organic compounds, containing one to eight carbons, were present. Overall, toluene and ethylene were present in the greatest amounts. At 140 m, concentrations of all components except ethylene increased. From 420 m to 990 m, concentrations of all components except toluene and m,p-xylene increased, possibly because of inversion layer formation and accompanying increases in temperature.

49933 **APTIC NO. 72289**

Kaczmarek, Edmond and Jean-Pierre Lubrez

APPLICATION OF GAS CHROMATOGRAPHY TO THE DETECTION OF AIR POLLUTANTS. *(Application de la chromatographie en phase gazeuse dans la detection des polluants atmospheriques). Text in French. Bull Sci. Inst. Text. Fr., 3(12):361-369, Nov. 1974. 2 refs.*

Pollutants emitted in different stages of the textile industry are reviewed, and gas chromatographic methods available for their detection and determination are described. Chlorinated solvents, such as perchloroethylene and trichloroethylene, are determined on Carbowax 20 M-impregnated chromosorb W columns at a column temperature of 90 C and a detector and injector temperature of 150 C, using nitrogen as carrier gas. Dye carriers, such as 1,2,4-trichlorobenzene and orthodichlorobenzene, are determined on standard SE 30 column. Waste gases generated during cotton singeing contain benzene, crotonaldehyde, furaldehyde, furane, allyl alcohol, methacrolein, acrolein, ethylene, ethane, propene, methanol, acetaldehyde, acetone propionic acid, toluene, furfural, methylfuraldehyde, and other more or less toxic hydrocarbons. Such waste gases should be destroyed by incineration.

49934 **APTIC NO. 69243**

Karalis, V. N., V. P. Kachalov, E. A. Korneyeva, and K. A. Trofimova

ANALYZERS FOR THE DETERMINATION OF MERCURY VAPORS IN AIR. *(Analizatory parov rtuti v vozdukhe). Text in Russian. Pribory Sist Upravleniya, no. 7:43-45, 1974. 14 refs.*

Modern analyzers for the determination of mercury vapors in the air are surveyed. Automatic colorimeters use continuously traveling indicator tapes whose color changes as a function of the mercury vapor concentration in the sample admitted, after which the color shift of the indicator plate is quantified by means of an electronic eye. The sensitivity of such instruments usually amounts to 0.1 mg/cu m. Modern, high-sensitivity methods are based on UV absorption by mercury vapors at 253.7 nanom. Most of these instruments are of single-canal design. The characteristic of mercury vapor analyzers by Bacharach, Beckmann, and Perkin-Elmer are presented. The relative error of these instruments ranges from + or - 5 to + or - 10%.

49935 **APTIC NO. 71661**

Kawasaki, G., Y. Hosono, I. Miyamoto, and O. Deguchi

METHOD FOR ANALYSIS OF VANADIUM IN SUSPENDED PARTICLES. *(Fuyu funjinchu no banajumu bunsekiho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 9(2):230, Nov. 1974. 2 refs. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 89.)*

Vanadium in airborne dust particles was determined by flameless atomic absorption, using a carbon rod atomizer. For vanadium concentrations of 0.5 microgram/ml, interference was negligible from potassium (+1), sodium (+1), calcium (+2), magnesium (+2), manganese (+2), sulfuric acid, iron (+3), and aluminum (+3) in concentrations from 10-100 times that of vanadium. At concentrations 1000 times that of vanadium, K, Na, and Ca exerted much negative interference. Air samples were taken from four locations, and vanadium concentrations of 0.20-0.32 micrograms/cu m were found in dust particulate concentrations of 377-499 micrograms/cu m.

49936 **APTIC NO. 71607**

Kikuchi, T. and M. Sone

AROMATIC HYDROCARBONS IN ATMOSPHERIC SAMPLES OF MIYAGI PREFECTURE. *(Miyagi-ken nai ni okeru kankyo taiki chuno hokozoku tankasuiso nodo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):199, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 56.)*

The chromatographic analysis method for atmospheric hydrocarbons was evaluated, and aromatic HC concentrations in Miyagi and in automotive exhaust gas were measured. Gaseous samples were concentrated using a Shimazu gas concentration device and then analyzed using Bentone 34-DIDP as sorbent and nitrogen gas as carrier. Calibration curves for benzene, toluene, xylene, ethylbenzene, and mesitylene were obtained. The peak area was measured by a Shimazu digital integrator, and a linear relationship was found between theamount injected and count numbers. The recovery rate of standard sample vaporized in vacuum bottle was 90-100% in the concentration range of 0.1 ppm. The ratios of C6H6, C6H5CH3, C6H5C2H5 and C6H4(CH3)2 to total HC (W/W%) in automotive exhaust gas were 9.86, 13.51, 3.70, and 11.32, respectively. The atmospheric concentrations measured (pphm) in Sendai, Shiogama, and Tagajo were 0.6-0.8 for C6H6, 0.2-21 for C6H5CH3, 0.2-0.7 for C6H5C2H5 and 0.6-3.9 for C6H4(CH3)2.

49937 **APTIC NO. 75270**

Kisler, C. Y. and B. S. Fishkin

TYPE PK-4 AUTOMATIC IMMERSION CONTACT ELECTRIC DUST MEASUREMENT INSTRUMENT. *(Pogruzhnoy avtomaticheskiy kontaktoelektricheskiy pylemer tipa PK-4). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 33-35, Sept. 1974. 4 refs. Translated from Russian, 6p., (Entire report of TR 104-75 processed under APTIC 70040.)*

An automatic method for the in situ measurement of dusts entrained in flue gases is described. The apparatus consists of a remote unit, a compressed air supply, and a measuring apparatus. The remote unit consists of an ejector with a sensitive element and a compressed air heater. The unit is installed in the flue at a point representative of the dust concentration. Solid particles entering the mixing chamber of the apparatus are entrained in the spiral motion of the compressed air, and centrifugal acceleration of the particles provides contact between them and the surface of the sensitive element. The electric current generated is recorded by the measurement apparatus. The electrical current is proportional to the flow rate of the solid phase, and, since the flow rate of the dust-laden gas through the ejector mixing chamber is stable, the current is also proportional to the concentration of the solid phase in the gas.

49938 **APTIC NO. 72157**

Kocache, Riado Mouhamed Adel and Danny Francis Holman

IMPROVEMENTS IN AND RELATING TO APPARATUS FOR THE TESTING OF GASES. *(Taylor Servomex Ltd., Sussex (England)) Brit. Pat. 1 366 227, 4p., Sept. 11, 1974. (Appl. Jan. 17, 1972, 5 claims)*

A method for measuring the magnetic susceptibility of a gas in order to determine its composition is described. The apparatus used consists of a test body suspended on a sheathed fiber suspended in a cell adapted to receive the gas to be tested. Means for subjecting the body to a magnetic field and for measuring the angular movement of the body, i.e., the deflecting force exerted on the test piece by the gas, are also provided. Two magnetic pole pieces are shaped to produce a nonuniform magnetic field and are located in the ends of the cell. A mirror may be used to detect the deflecting force of the gas.

49939 **APTIC NO. 71657**

Koller, W. and M. Rotter

FURTHER INVESTIGATIONS ON THE SUITABILITY OF GELATINE FILTERS FOR THE COLLECTION OF AIRBORNE BACTERIA. *(Weitere Untersuchungen ueber die Eignung von Gelatinefiltern zur Sammlung von Luftkeimen). Text in German. Zentralbl. Bakteriol. Hyg., Infectionskr. Abt. Orig. B, 159(5-6):546-559, 1974. 4 refs.*

Various factors concerning the suitability of gelatine filters for the collection of airborne bacteria have been examined. The retaining efficiency of gelatine filters was 99.954% for particles 0.5-1.5 micron and 99.967% for particles 1.6-3.0 micron. The average thickness of the filters was 276.07 + or - 49.71 micron with an average deviation of 10.56% within one filter. At a constant pressure difference of 500 mm water the average volume of filtrated air was 1820 + or - 389.22 l/hr. There is a positive correlation between filter thickness and flow-rate. No difference was noted when the filters were dissolved in different volumes of fluid. Shaking of dissolved filters in fluids together with glass beads caused a considerable increase of the bacterial yield. The treatment of exposed filters by sterile air caused a loss of viable bacteria up to 35%. Bacteria collected on membrane filters are much more sensitive than those deposited on gelatine filter, which results in 25% higher counts on the latter

49940 **APTIC NO. 75281**

Kouzov, P. A. and G. M. Skryabin

NEW ROTARY ANALYZER FOR PARTICLE SIZE COMPOSITION OF INDUSTRIAL DUSTS. *(Novyy rotatsionnyy analizator dispersnogo sostava promyshlennoy pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-10, Sept. 1974. 5 refs. Translated from Russian. 10p. (Entire report of TR 104-75 processed under APTIC 70040.)*

A rotary analyzer for particle size composition measurements of industrial dusts entering dust collectors is described that does not alter the initial aggregate state of the dust sampled. The analyzer is a flow type rotary centrifuge. The dust-laden gas is drawn through the channel of the rotor, and the particles are separated from the flow by centrifugal force, being deposited on the walls of the channel. The particle size composition of the dust is calculated from the distribution of the weight of the deposit over the channel length. The amount of dust deposited per unit volume of the gas gives the dust content of the stream. Minimum sampling time with a dust content between 0.1 and 1.0 g/cu m is from 1-10 min. Laboratory samplings of quartz dust ranging in size from 5-32 micron revealed deviations of less than 2% between the rotary analyzer and a pipette apparatus.

49941 **APTIC NO. 72022**

Kreiss, W. T., J. M. Lansinger, and W. G. Tank

HOW SHOULD VISIBILITY BE MEASURED? *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 37p., 1974. 8 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section Annual Meeting, Boise, Idaho, Nov. 17-19, 1974.)*

A 3 month field test program was used to evaluate the performance of three instrumental methods for measuring the visual quality of the atmosphere. The instruments were a telephotometer, an transmissometer, and two integrating nephelometers, a visual range estimate of a trained human observer was used as a reference case. The best correlation between observer and instrument derived visibility estimates were obtained with the telephotometer. The best correlation between the natural logarithms of the visual ranges noted by the observer and derived from data obtained with both the transmissometer and telephotometer were for the lowest values of prevailing visibility. There was no clear-cut, systematic variation in the nephelometer/observer visual range correlation through the various prevailing visibility categories. All three instruments were reliable. The main difficulty with the telephotometer was that the angular field-of-view of the collecting optics was larger than stated in the manufacturer s specification. The main disadvantage of the transmissometer was that it locked to a fixed baseline measurement. It also proved sensitive to refraction effects. The nephelometer involved the most complicated calibration procedure. Its singular disadvantage was that it performed a point measurement, whereas visibility is a function of an integrated atmospheric state.

49942 **APTIC NO. 71693**

Kuwata, K., Y. Yamasaki, Y. Eguchi, and Y. Matsuo

GAS CHROMATOGRAPHIC ANALYSIS OF AROMATIC HYDROCARBONS, ESTERS, KETONES, AND ALCOHOLS. *(Gas chromatography ni yoru hokozoku tankasuiso, ketone, ester, alcohol rui no bunseki (1)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):196, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974.)*

Gas chromatographic analysis of organic compounds using a sampling loop has the advantages of high sensitivity, no temperature correction required, and little effect of adsorption. Aromatic hydrocarbons (from benzene to 1,2,3-trimethylbenzene), ketones (methyl ethyl ketone and methyl i-butyl ketone), ethyl acetate, and butanol were analyzed with a flame ionization detector at 0.1 ppm levels. The column was 8 mm inside diameter by 3 m packed with 20% PEO 20 M on Celite 545 (80/100 mesh).

49943 **APTIC NO. 72298**

Leschonski Kurt, Wulf Alex, and Bernd Koglin

PARTICLE SIZE ANALYSIS 6. SEPARATING METHODS (CONTINUED). *(Teilchengroessenanalyse. 6. Trennverfahren (Fortsetzung)). Text in German. Chem.-Ing.-Tech., 46(21):901-904, 1974. 20 refs.*

A tutorial discussion of particle size analysis by various sifting methods is given. In particular gravitational countercurrent sifters such as the Gonell wind sifter, the Roller sifter, the Kaiser and Guye sifter, and the Rumpf, Leschonski and Weilbacher sifters are described. Furthermore, a discussion of the sifting principle of centrifugal countercurrent sifters is given along with a description of the centrifugal countercurrent sifter by Bahco. The Holderbank and zick-zack sifters, which operate according to different sifting principles, are briefly discussed.

49944 **APTIC NO. 68043**

Mammarella, Luigi

OUTLINES OF THE USE AND OPERATION OF AIR MONITORING NETWORKS. *(Lineamenti per l impianto e la conduzione di reti di campionamento dell aria). Text in Italian. Ingegnere, Milan, 49(6):278-286, June 1974. 9 refs.*

The different types and purposes of air quality monitoring networks and their operation are described. Monitoring networks that as a rule have to comprise at least 4 or 5 sampling stations can be established for identifiable sources, for preventive monitoring in industrial areas, for critical monitoring in definite residential areas where critical pollution events occur, and for monitoring in urban centers. The density of the necessary sampling network increases with the population density and the overall pollution level in the area to be monitored. Carbon monoxide, sulfur dioxide, and nitrogen oxides are the leading pollutants to be monitored in urban centers. Dustfall gauges, settling filters, high volume samplers, differential samplers, impingers, bubblers, peroxide cartridges for sulfur dioxide, sequential samplers, and continuously operating automatic recording instruments are used in sampling stations along with meteorological instruments, such as the anemograph, and hydrograph.

49945 **APTIC NO. 71743**

Masaki, Hiroaki

DETECTOR PIECE FOR HYDROGEN SULFIDE GAS ANALYSIS. *(Ryuka suiso gasu bunseki yo shikenhen). Text in Japanese. (Denki Kagaku Keiki, Ltd., Musashino, Tokyo (Japan)) Japan. Pat. Sho 49-46276. 6p., Dec. 9, 1974. (Appl. Aug. 3, 1967, 1 claim).*

A new detector is impregnated with reagent which reacts with hydrogen sulfide gas resulting in coloration. The device consists of two reels with the detecting piece attached to the two ends, a light source on one side, a light detector on the other side of the detector piece, a lens in front of the light source, and a recorder. The device is applicable to the detection of chlorine, arsine, and hydrogen cyanide in addition to H_2S. The reagents used to impregnate the detector piece for H_2S detection are lead acetate, cadmium acetate, and copper acetate and the color changes before and after reactions are white to black, white to yellow, and light blue to black, respectively. The reagents for Cl_2 and AsH_3 detector are 4,4 prime-dimethylaminothiobenzophenone and mercuric bromide, respectively, and those for HCN detection are picric acid and benzidine acetate, and the color changes are brown to dark blue, white to yellow, yellow to light brown, and white to blue, respectively.

49946 **APTIC NO. 72023**

Matsushita, H.

ANALYSIS OF CARCINOGENIC HYDROCARBONS. *(Hatsugansei tanka suiso rui no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 9(2):128-133, Nov. 1974.*

Analysis of carcinogenic hydrocarbons in airborne dust is done by vacuum sublimation extraction of the sample dust followed by a two dimentional-two layers thin layer chromatographic separation. The positions of developed spots are determined by an ultraviolet light and each spot is scrubbed and extracted for spectrographic identification. There were 76 spots separated, of which 26 were identified including benzo(a)pyrene, chrysene, benzo(a)anthracene, and benzo(ghi)perylene. The precision of the technique was determined using a standard sample, and the standard deviation of components in the sample ranged from 0.73 to 2.62. The benzo(a)pyrene can be used as an atmospheric carcinogenic index compound, since previously published data indicated the correlation of benzo(a)pyrene with some other carcinogenic hydrocarbons, and also indicated that higher benzo(a)pyrene levels were found in dust particles sized smaller than 8 micron. When an ultrasonic extraction technique was used instead of the vacuum sublimation extraction technique, a faster extraction was achieved, however the selectivity of extractable compounds was poorer in the ultrasonic technique.

49947 **APTIC NO. 72189**

Matsushita, H. and K. Arashidani

ANALYSIS OF CARCINOGENIC AROMATIC HYDROCARBONS IN POLLUTED PARTICULATES BY HIGH-SPEED LIQUID CHROMATOGRAPHY. *(Kosoku ekitai kuromatogurafi ni yoru osen funjinchu no hatsugansei tanka suiso no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 9(2):598, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 445.)*

The utility of high speed liquid chromatography in determination of carcinogenic hydrocarbons in polluted dust particulates was investigated. The high speed liquid chromatograph used was Type 830 manufactured by DuPont Company. Twenty-five standard substances and vacuum sublimated materials were analyzed. Advantages of this method include speed of separation; reproducibility of retention time; ease of clean-up; linear relationships obtainable (between logarithm of retention time and methanol content of the mobile phase, between logarithm of retention time and number of carbons in hydrocarbons, and when composition of the mobile phase is constant); and linearity of reference lines. Disadvantages include the necessity for proficiency in microanalytical techniques and the fact that each peak can be composed of several compounds. However, use of a fluorescence detector (Hitachi Type 204 with micro-flow-cell attachment) at the suitable wavelength resulted in excellent resolution of benzo(a)pyrene.

49948 **APTIC NO. 72231**

Matsushita, H., K. Arashidani, and H. Hayashi

ANALYTICAL METHOD FOR POLYNUCLEAR AROMATIC HYDROCARBONS IN POLLUTED PARTICULATES USING A VACUUM SUBLIMATION APPARATUS WITH MULTIPLE SUBLIMATION TUBES. *(Tarenkei shinku shoka sochi o mochiita osen funjinchu no takan hokozoku tanka suiso no bunsekiho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 9(2):599, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 446.)*

A multiple-stage vacuum sublimation apparatus was used to extract polynuclear aromatic hydrocarbons from polluted dust particles. A cylindrical aluminum block, containing holes for seven sublimation flasks, wrapped with Nichrome wire outside, and insulated against heat loss, was used as the furnace. In the test runs, pyrene, chrysene, and benzo(a)pyrene were recovered, but except for pyrene, poor results were obtained.

49949 **APTIC NO. 69508**

Miller, August, Robert L. Armstrong, and Charles W. Welch

RESEARCH IN THE AREA OF ATMOSPHERIC MODELING: HIGH RESOLUTION ATMOSPHERIC IR TRANSMITTANCE PRODUCTION. *New Mexico State Univ., Las Cruces, Dept. of Physics, Army Electronics Command Contract DAAD07-73-C-0134, Proj. 1T061102B53A, Task 19, Program Element 61102A, Work Order 514CC, Rept. NMSU-PHYS-537-74-1, 128p., June 1, 1974. 38 refs.*

NTIS, DDC: AD 780 914

The basic elements of line by line prediction of atmospheric transmittance at infrared wavelengths, and the quantum mechanical bases of line parameter computation are reviewed. Emphasis was placed on literature studies and the calculation of line positions and line strengths in carbon monoxide. These efforts were aimed at preparing the capability for theoretical generation of line parameters in CO and other diatomic gases. A FORTRAN IV computer program utilizing the AFCRL Atmospheric Absorption Line Parameters Data Compilation tape for high resolution transmittance prediction under homogeneous conditions is presented together with running instructions. Molecules included in the compilation are water, ozone, CO, carbon dioxide, nitrous oxide, oxygen, and methane. An analysis of the effects of using collisionally narrowed line profiles rather than simple Lorentzian profiles is included and suggests that collisional narrowing may be significant with certain types of transmission paths. (Author abstract modified)

49950 **APTIC NO. 71553**

Mooradian, A., A. S. Pine, and R. W. Ralston

DEVELOPMENT OF TUNABLE SEMICONDUCTOR LASERS FOR APPLICATION TO AIR POLLUTION MEASUREMENTS (FINAL REPORT). *Massachusetts Inst. of Tech., Lexington, Lincoln Lab., National Science Foundation Grant GI-34990, NSF-RANN-II-GI-34990-PR-74-5, 128p., Jan. 1974. 114 refs.*

Tunable semiconductor lasers were developed for application to air pollution monitoring. Broad tunability was achieved in the near- and mid-infrared with Doppler-limited spectral resolution using pressure-tuned gallium arsenic and lead sulfur selenium diodes at 77 K. A stable and compact pressure tuning system was developed that allows the detection of a large number of pollutants with a single device. Lead sulfide diode lasers were fabricated that emit up to 50 mW CW in a single mode at 10 K. These high powers may be utilized for remote heterodyne detection of hot pollutant gases and for sensitive point monitoring with spectrophones.

49951 **APTIC NO. 72117**

Nakadoi, Takashi

ANALYSIS OF GASEOUS REACTION PRODUCTS AND ITS DIFFICULTIES. *(Hanno seisei butsu to sono bunsekijo no mondaiten, gasujo bushitsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):105-112, Nov. 1974. 22 refs.*

Analytical methods for photochemical reaction products are summarized categorically including methodological limitations and difficulties. The Saltzman method and chemiluminescence method are commonly used for nitrogen oxides analyses, but use of the latter method for field analysis is not common. The chemiluminescence method has linear response with concentration, and higher sensitivity than the Saltzman method, and also its operation is very simple. The Saltzman method tends to give higher analytical values for nitric oxide and lower values for nitrogen dioxide than the chemiluminescence method. The analysis of hydrocarbons is done mostly by gas chromatography. Continuous analysis of non-methane hydrocarbons is well organized, since they can be separated completely from methane using a separation column such as porapack-Q. The potassium iodide method is used for oxidant analyses according to the Japan Environmental Standard method, however the chemiluminescence method has a greater potential to analyze ozone and peroxyacetyl nitrate compounds since there is less intereference with this method. The detection limit of PAN by chemilaminscence method is around 6 ppb. Gas chromatography coald be used for a continuous PAN analysis, and infrared absorption could also determine PAN at 8.6 micron for acetyl group absorption and 12.6 micron for peroxy alkyl group absorption, however the detection limit by IR absorption is not as great as than by chemiluminescence (800-880 ppm). The simultaneous analyses of peroxy propionyl nitrate, peroxy- n-butyryl nitrate, and PAN can be done by GC with an electron capture detector. Analyses of carbonyl compounds and aerosol are also discussed.

49952 **APTIC NO. 72365**

Nakae, Shigeru

PHYSICAL MEASUREMENT OF ATMOSPHERIC POLLUTION BY SUSPENDED PARTICULATES. *(Taiki biryushi osen no butsuri keisoku-ho). Text in Japanese. Sangyo Kogai Boshi Gijutsu (Ind. Pollut. Control Tech.), 1974:114-119. June 1974. 26 refs.*

The size distribution of particles larger than 0.1 micron in radius, the method of measurement of particle number concentration in space, the size distribution of particles smaller than 0.1 micron in radius, and the measure of the suspended particulates by the atmosphere-electric means are discussed. Particle size is usually measured by the scattering of light when the particle size is larger than 0.1 micron in radius. The radius distribution of the particles obeys the Junge distribution quite well. The number of suspended particulates in air is most conveniently measured by the Aitken nucleus counter, which counts the number of fog particles formed by adiabatic expansion. A particle size enlarging apparatus of the mixer type is also often adopted. The particle size distribution of particles smaller than 0.1 micron in radius is measured by the measurement of the precipitating rate, diffusion coefficient, or electrical mobility. The last one is especially suited for continuous and automatic measurement. As a measure of air pollution suspended particulates, the electrical conductivity of air is often used, especially on the ocean.

49953 **APTIC NO. 69748**

Nakata, Hidehiko, Masayoshi Yokota, and Tadao Kawarabayashi

ANALYSIS OF BACTERIAL AEROSOL--ESPECIALLY ON ANALYSIS OF AIRBORNE BACTERIA BY IMPINGER METHOD. *(Bakuteriaru earozoru no bunseki-tokuni impinjya ho ni yoru kuchu fuyu saikin ni tsuite). Text in Japanese. Preprint, Japanese Society of Public Health, Fukushima, p. 402, 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 532.)*

Bacterial aerosol samples were collected by the impinger method in a college lecture hall while students were present, and after their departure. Staphylococci concentrations were measured. Outdoor staphylococci concentrations were also measured by the impinger method. Analytical methods for staphylococci included the coagulase test, DNase test, the blood solubility test (alpha, beta, delta). The impinger method seems to be a suitable collection technique for quantitation of airborne bacteria.

49954 **APTIC NO. 71529**

Nicholson, N. M. and J. Davey

THE ANALYSIS OF SMALL QUANTITIES OF ENVIRONMENTAL DUST SAMPLES. *British Steel Corp., Sheffield, England, General Steels Div., Rept. GS/EX/44/74/C, 12p., 1974.*

Reagents, procedures, and calibration data are given for an atomic absorption spectrophotometric method for the determination of iron, manganese, copper, zinc, lead, nickel, chromium, and cadmium in samples of airborne dust and fumes obtained by a filtering procedure. The method is particularly applicable to working environments such as welding shops. The limit of detection for each of the above elements is under a tenth of a microgram/ml, and minimum samples weights range from 18.75 (for zinc) to 100 micrograms (for chromium and lead). No mutual interference occurs between the elements under examination. The method can also be adopted for the determination of toxic heavy metals in flue dusts using a procedure outlined in an appendix.

49955 **APTIC NO. 72206**

Nielsen, J., N. C. Nielsen, G. Guernier, and M. Enjalbert

CONTINUOUS SPECTROPHOTOMETRIC ANALYSIS OF A MIXTURE OF NITRIC OXIDE, NITROGEN DIOXIDE, NITROUS ANHYDRIDE, AND NITROGEN TETROXIDE. *(Spectrophotometre pour l analyse en continu d un melange d oxydes d azote, NO, NO2, N2O3, N2O4). Text in French. Analusis, 2(10-11):750-756, 1973-1974. 15 refs.*

A reliable spectrophotometer for the determination of nitrogen dioxide in its mixture with nitric oxide, nitrous anhydride, and nitrogen tetroxide in proportion with the degree of oxidation is described. The light absorption by NO2 is measured at a wavelength of 436 nm. To avoid errors due to entrained liquid droplets, the less intense absorption by NO2 is also measured at 546 nm for which nitrous anhydride has minimum absorption. Both wavelengths are emitted by the same lamp, and separated by a semi-transparent mirror behind the cell.

49956 **APTIC NO. 71745**

Nogami, Y., S. Moriwake, and N. Moriyama

STUDIES ON THE AUTOMATION OF ATMOSPHERIC HEAVY METAL DETERMINATION BY X-RAY FLUORESCENCE ANALYSIS (I). *(Keiko X-sen ni yoru taikichu no jukinzoku sokutei no shisutemuka ni kansuru kento (I)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):233, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 92.)*

Automatic sampling and a data processing system are described for determination of atmospheric heavy metals by X-ray fluorescence analysis. A suitable membrane filter (Millipore AA, 0.8 micron) was used, and the reference line was found from a standard sample by using the DDTC method. Flow rates up to 30 l/min were not impeded by the filter. Corrections were necessary thereafter. When amounts of heavy metals in airborne dust samples were over 10 micrograms, reliability and accuracy were assured. Monitoring was conducted at 6, 8, 12, and 24-hour intervals for elements such as iron, lead, manganese, zinc, nickel. Pollution patterns as well as composition of dust particulates were discerned.

49957 **APTIC NO. 71758**

Numano, Yuji and Isaku Watanabe

FILTER APPARATUS FOR EXHAUST GAS ANALYSIS. *(Haigasu bunsekiyo rokaki). Text in Japanese. (Komei Rikagaku Ind. Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 49-44156. 3p., Dec. 3, 1974. (Appl. May 14, 1968).*

A single apparatus for simultaneous removal of both dust and moisture is described. The apparatus has a double chamber structure. Sample gas enters the inner chamber filled with filter material, such as glass wool, and dust contents in the gas are filtered out first; then it enters the outer chamber which has several fins and condenses the moisture contents. The condensed water is drained out from the bottom of the chamber by a vacuum pump. The same vacuum pump is connected to the side of the chamber from which a gas sample is sucked out for analyses. The apparatus reduce the required time for sample gas pretreatment and has smaller dead volume than using two separate apparatuses for dust and moisture removal from sample gas. Moisture condensed within the inner chamber strengthens the efficiency of dust removal.

49958 **APTIC NO. 72285**

Okada, Takashi

MEASUREMENT TECHNIQUE FOR AEROSOL PARTICLE SIZE DISTRIBUTION. *(Earozoru no ryudo bunpu sokuteiho). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc. (Tokyo), 12(4):2-19, Oct. 1974. 52 refs.*

Measurement techniques for aerosol particle size distribution utilizing the kinetic properties of aerosols and light scattering were discussed. Properties such as gravity precipitation, Brownian movement, force of inertia, centrifugal precipitation, and electrophoretic behavior are successfully employed in the measurement. Brownian movement is important for particles smaller than 1 micron, while gravity precipitation is negligible for particles smaller than 0.1 micron. The Whitby aerosol analyzer is developed to measure size distribution of submicron particles electrophoretically by charging the particles with corona discharge before they are introduced to a mobility analyzer. Rayleigh scattering is usually used for particles smaller than 0.1 micron, while Mie scattering is useful for those larger than 0.1 micron. Light scattering apparatus includes photometers and particle counters. A combination of more than two methods is sometimes necessary for aerosols having a wide range of particle distribution.

49959 **APTIC NO. 71900**

Ortiz, Lawrence W., Harry J. Ettinger, Charles I. Fairchild, and Marvin I. Tillery

AEROSOL RESEARCH AND DEVELOPMENT RELATED TO HEALTH HAZARD ANALYSIS. JANUARY 1 THROUGH JUNE 30, 1974 (PROGRESS REPORT). *New Mexico, Industrial Hygiene Group, Los Alamos Scientific Lab., National Institute for Occupational Safety and Health Proj. RO72, Rept. University of California-41, 14p., Nov. 1974. 6 refs.*

NTIS: LA-5797-PR

Evaluations of 10-millimeter nylon cyclone personal samplers for measuring respirable fractions of airborne fibrous glass were conducted using aerosols ranging from 3.1-4.0 micron with geometrical standard deviations of about 1.8. Reasonable estimates of the respirable mass fraction were obtained when the cyclone was operated at a flow rate of 1.7 l/min. Measurements of coal dust loading effects on the performance of the personal samplers indicated that negligible errors in respirable mass occurred with such loading under normal sampling conditions. The errors observed were small relative to inherent field sampling errors. Electrical charge also demonstrated a minimal effect on performance of the cyclone when sampling coal dust. (Author abstract modified)

49960 **APTIC NO. 72099**

Ozaki, Koji and Katsunori Honma

EFFECTS OF AIR VELOCITY ON AEROSOL SAMPLING. *(Earozoru no hoshu ni okeru torikomi fusoku no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):253, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 114.)*

Discrepancies between aerosol trapping efficiencies by low-volume and high-volume air samplers are studied. Fly ash, silica powder, and colloidal silica are used as simulated atmospheric dust. Three different nozzle sizes are used: 0.785 sq cm, 4.0 sq cm, and 19.5 sq cm. The suction velocities used are 20 l/min and 5 l/min. A 1/12 reduction of sampler inlet size is achieved by attaching a cone-shaped head to the sampler inlet. When the trapping efficiency for the experiment utilizing 425 cm/sec air velocity at the nozzle is defined as 1, only a 10% decrease in the efficiency occurs with the air velocity of 5 cm/sec. The 10% decrease cannot explain the 50% decrease generally observed when a low volume air sampler is used. The experiment concerning the effect of sampler inlet size showed that there was no difference in trapping efficiency whether or not the cone-shaped cover was employed. Therefore, neither air velocity nor sampler inlet size can be major causes of the discrepancy.

49961 **APTIC NO. 71902**

Padnos, Norman and Edward F. Ferrand

COMPARISON ON INSTRUMENTAL METHODS FOR MONITORING OF NITROGEN DIOXIDE. *Preprint, Instrument Society of America, Pittsburgh, Pa., 8p., 1974. 8 refs. (Presented at the Instrument Society of America International Instrumentation-Automation Conference and Exhibit, New York, Oct. 28-31, 1974, Paper 74-702.)*

Instrumental methods for monitoring nitrogen dioxide in concentrations of 0.05 ppm are compared. The limits of detection for colorimetric instruments are 1-5 ppb. Typical full scale ranges are 0-0.1, 0-0.5, 0-1.0, 0-2.0 ppm and greater. Chemiluminescence analyzers monitor light emissions from electronically excited NO2 formed by reaction of nitric oxide with ozone. Minimum detectable concentrations are typically 5-20 ppb. A spectroscopic instrument was developed which can detect 10 ppb of NO2. One model can monitor sulfur dioxide, NO, NO2, and O3 sequentially. The spectrometric instrument has ranges of 0 to 0.5 and 0 to 5 ppm. In coulometric analyzers, NO2 is determined by reaction with an iodide solution followed by coulometric sensing of the iodine formed. The minimum detectable concentration for NO or NO2 is about 4 to 10 ppb. Two chemiluminescence instruments were compared when monitoring ambient air and their zero drift, span drift, and noise level were determined.

49962 **APTIC NO. 71911**

Paterson, M. P. and R. S. Scorer

QUALITY CONTROL IN GLOBAL AND REGIONAL AIR CHEMISTRY MONITORING NETWORKS: LESSONS OF THE EUROPEAN AIR CHEMISTRY NETWORK. *Preprint, World Health Organization Geneva (Switzerland) and World Meteorological Organization,* *Geneva (Switzerland), 4p., 1974 (?). 3 refs. (Presented at the World Meteorological Organization/World Health Organization Technical Conference on The Observation and Measurement of Atmospheric Pollution, Helsinki, Finland, July-Aug. 1973.)*

The regional monitoring program of the European Air Chemistry Network (EACN) which seeks to determine a calcium/magnesium ratio is described. Most Mg comes from the sea, while most Ca is of land origin. The ratio would indicate the position of the site between sea sources and land sources and would be an index of continentality; however, only the Scandinavian regional data was accurate. Data from the inlet stations from Denmark to Austria to France could not be used because of errors made by the laboratories analyzing the samples. The errors show continuity over dozens of successive months and apply equally to all samples analyzed in the laboratory.

49963 **APTIC NO. 75084**

Reisman E., W. D. Gerber, and N. D. Potter

IN-STACK TRANSMISSOMETER MEASUREMENT OF PARTICULATE OPACITY AND MASS CONCENTRATION (FINAL REPORT). *Philco-Ford Corp., Newport Beach, Calif., Aeronutronic Div., Environmental Protection Agency Contract 68-02-1229, Program Element 1AA010, ROAP 26AAM, Rept. EPA-650/2-74-120, 116p., Nov. 1974. 12 refs.*

Field test evaluations of a transmissometer for in-stack measurements of particulate opacity and mass concentration were conducted at six industrial sites. The performance of the transmissometer as a continuous monitor was evaluated at each site for a period of 30 days. Plume opacities were also measured by one of several objective methods such as telephotometry, and mass concentrations were measured directly with an Environmental Protection Agency particulate sampling train (Method 5) for comparison purposes. The transmissometer performed accurately and reliably, detecting density changes of 0.001. The presence of water droplets when the stack gas was below the dew point temperature was recorded by the instrument as particulates, and the presence of sulfur trioxide in vapor form was not detected since, like all optical devices, the transmissometer only measures the characteristics of the particulates it encounters. Zero drifts were generally very small for the instrument. At one site a high vibration level created the need for continual check of the alignment.

49964 **APTIC NO. 71562**

Robertson, D. E. and R. Carpenter

NEUTRON ACTIVATION TECHNIQUES FOR THE MEASUREMENT OF TRACE METALS IN ENVIRONMENTAL SAMPLES. *Battelle Memorial Inst., Pacific Northwest Lab., Richland, Washington and Washington Univ., Seattle, National Academy of Sciences-National Research Council, Subcommittee on Radiochemistry Contract, 79p., Jan. 1974. 109 refs.*

NTIS: NAS-NS 3114

Neutron activation techniques for the measurement of trace metals in environmental samples are reviewed. A typical procedure for the analysis of elements forming short-lived activation products is to irradiate the filter sample for 5 min in a rabbit facility at a thermal neutron flux of about 1-50 times 10 to the 12 n/sq cm/sec, wait 2-10 min after the irradiation, and then count the sample for 5-10 min on a germanium-lithium diode detector. The measurement of elements forming intermediate and long-lived radionuclides can be achieved by irradiating the same sample or a portion of the same filter, plus elemental standards, for 5-8 hr at a thermal neutron flux of 1-50 times 10 to the 12 n/sq cm/sec and transferring the samples and standards to new counting containers. Counting is performed on a Ge-Li detector for 10-30 min when 1-3 days out of the reactor and for 60-200 min when 10-30 days out of the reactor and for 60-200 min when 10-30 days out of the reactor. Detection sensitivities for multielement analysis of aerosols are not fixed values but rather are strongly dependent on the composition of the sample. Gamma-ray spectra are illustrated for an aerosol sample collected in a highly industrialized region.

49965 **APTIC NO. 71915**

Rodes, Charles

FEASIBILITY OF A SPINNING PARTICULATE FILTER FOR SOURCE EMISSION ANALYSIS STREAMS. *Preprint, Instrument Society of America, Pittsburgh, Pa., 11p., 1974. 3 refs. (Presented at the Instrument Society of America Analytical Instrumentation Symposium Proceedings, 20th Annual, Pittsburgh, Pa., May 13, 1974.)*

A spinning particulate filter for extractive gas sampling is described that offers advantages over existing in-line sampling filters, particularly when the gas to be sampled is heavily contaminated with particulates. The process involves the rotation of cylindrical filter to accomplish a boundary layer for preventing particles from reaching the filter surface and to establish a centrifugal force at the filter surface for the spinning off of agglomerated particles. Laboratory tests indicate that the mass of particles deposited on the in-line filter decreases as the rotational speed is increased, and extrapolation indicates that speeds can be reached at which no particles reach the in-line filter. Field tests on a power plant flue (before the control device) consisting of several 24 and 48-hour runs at a flow rate of 5.0 l/min and a filter rotating speed of 2500 rpm showed no increase in pressure drops for periods up to 48 hr.

49966 **APTIC NO. 68064**

Saito, Akira

ANALYTICAL METHODS OF NITROGEN OXIDE IN EXHAUST GASES. *(Haigasu chu no chissosankabutsu bunseki hoho). Text in Japanese. Nihon gasu Kyokai Shi (J. Japan Gas Assoc.), 27(2):28-38, Feb. 1974. 5 refs.*

Seven methods of chemical analysis of nitrogen oxides are reviewed. In the phenoldisulfonic acid method, NOx in the sample gas is absorbed into oxidizing absorber (sulfuric acid and hydrogen peroxide) and converted into nitrate ion which reacts with phenoldisulfonic acid to form color. Its absorbance is measured to determine NOx concentration in the sample. From 10 - 300 ppm of NOx is measurable, but the determination is disturbed by the existence of inorganic nitrate, nitric compounds, organic nitrogen compounds, and halogen compounds. Since 16 hr is required to oxidize NOx, it takes 20 hr for thy total analysis. In the rapid phenoldisulfonic acid method NOx is oxidized by oxygen gas within 2 hr. Since the rest of the procedure is the same as in the standard phenoldisulfonic method, analysis time is reduced and 50 - 10000 ppm of NOx can be analyzed. In the zinc reduction-naphthylenediamine method NOx in the sample gas is oxidized to nitrate ion by ozone in aqueous solution. Nitrate ion then is reduced to nitrite ion by zinc powder and the absorbance of the complex of nitrite ion and sulfonyl amide (?) and naphthylethylenediamine is measured. From 10 - 1000 ppm of NOx is analyzable but large amounts of sulfur dioxide interfere with the analysis.

49967 **APTIC NO. 71658**

Sakai, T., H. Ito, and M. Kitase

EVALUATION OF HEAVY METAL AIR POLLUTION SAMPLING METHODS. *(Sanpuringu-ho no chigai ni yoru jukinzoku osen no hyoka). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):236, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 95.)*

Results are compared from high-volume and low-volume air sampler determinations of dust and lead concentrations. In locations far enough distant from the pollution source, high-volume and low-volume sampling results for dust and lead concentrations correlated well. Near the pollution source, stable atmospheric conditions restuled in good correlation, but varying atmospheric conditions during the period of observation resulted in scatter.

49968 **APTIC NO. 71524**

Sawicki, Carole R.

SAMPLING AND ANALYSIS OF THE VARIOUS FORMS OF ATMOSPHERIC LEAD (SEMINAR SUMMARY). *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab., 16p., Sept. 16, 1974.*

A summary of 10 presentations on the sampling and analysis of the various forms of atmospheric lead is presented. The topics include: a flameless atomic absorption device for the determination of particulate and molecular atmospheric Pb; determination of filter collection efficiencies; a sampling train consisting of a filter, activated carbon scrubber, and two impingers; a filtration system for atmospheric Pb; filter efficiency for Pb particulates; a sampling train used for collection of atmospheric Pb consisting of a millipore filter followed by an activated charcoal or iodine monochloride scrubber; and size distribution of particles and filter efficiencies. Greater than 95% of the total Pb is collected on the primary filter and the small percentage of organic Pb that exists is efficiently collected on the secondary carbon filter.

49969 **APTIC NO. 72299**

Schaetzle, P.

AUTOMATIC AIR SAMPLING, AN IMPORTANT MEANS FOR EMISSION AND IMMISSION MEASUREMENTS. *(Die automatische Luftprobenentnahme als wichtiges Hilfsmittel in der Emissions- und Immissionsmesstechnik). Text in German. Gesundheitstech., 8(11): 292-293, 1974. 2 refs.*

A new air sampling system for simultaneous sampling of aerosols and gases is described. The air to be examined is drawn with a speed of 1 to 2 l/min by means of a membrane pump into a filter/impinger set out of a total of eight sets whose magnetic valve permits entrance. After the preselected sampling time is over, the next filter/impinger set is switched on. The total quantity of air drawn through an impinger set is digitally indicated. Through an additional device the filters can be by- passed and the samples are directly passed to the impingers.

49970 **APTIC NO. 71696**

Seifert, B. and M. Kolbe

THIN LAYER CHROMATOGRAPHIC SEPARATION OF THE 2,4-DINITROPHENYLHYDRAZONES OF FORMALDEHYDE, ACETALDEHYDE, ACROLEIN, CROTONALDEHYDE AND FURFUROL. *(Dunneschicht- chromatographische Trennung der 2,4-Dinitrophenylhydrazone von Formaldehyd, Acetaldehyd, Acrolein, Crotonaldehyd und Furfurol). Text in German. Fresenius Z. Anal. Chem., 271(5):337- 340, 1974. 17 refs.*

A thin-layer chromatographic method for the separation of the 2,4-dinitrophenylhydrazone derivatives of formaldehyde, acetaldehyde, acrolein, crotonaldehyde, and furfurol is described. The derivatives are applied on rapid plate F 254 silica gel from pyridine, tetrahydrofuran, or dioxan solution and separated during a 6-hour run by ascending overrun development using carbon tetrachloride/pyridine (90:10) as a solvent. The distances travelled from the starting point are in the ratio 1:13:1.7:2.1:2.3.

49971 **APTIC NO. 71606**

Shirayama, H. and H. Okumura

DETERMINATION OF BENZENE, TOLUENE AND XYLENE IN THE ATMOSPHERE BY GAS CHROMATOGRAPHY. *(Gasu kuromato gurafu-ho niyoru taikichu benzen, toruen, kishiren no sokuteiho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):198, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 55.)*

Atmospheric concentrations of benzene, toluene, and o-, m-, and p-xylene were measured at six factories and near a highway by gas chromatography. Using chromosorb W-AW coated with Bentone 34 and DIDP as sorbent, measurements were made at temperatures of 80, 100, and 150 C for column, injector, and detector and at flow rates of 52, 48 and 350 ml/min for nitrogen, helium, and air. Calibration curves were obtained by measuring the peak area of standard solution prepared by diluting with n-hexane. The recovery rates were obtained by comparing the result of analysis with and without the concentration process of gaseous samples, which were 81.0-124% for C6H6, 76.0-104% for C6H5CH3, 77.7-93.6% for o- m- and p-C6H4(CH3)2. The atmospheric concentrations (ppm) measured (and measurement sensitivity ppm) were 0.015-1.7 (0.015) for C6H6, 0.027-1.47 (0.013) for C6H5CH3, trace to 0.170 (0.011) for p-C6H4(CH3)2, 0.021-039 (0.011) for m-C6H4(CH3)2, and 0.020-0.190 (0.011) for o-C6H4(CH3)2.

49972 **APTIC NO. 71605**

Simonov, V. A., Y. V. Nekhorosheva, and N. A. Zavorovskaya

THE USE OF IR SPECTROSCOPY FOR THE DETERMINATION OF ENVIRONMENTAL POLLUTANTS. *(Ispol zovaniye infrakrasnoy spektroskopii dlya opredeleniya zagryazneniy vneshney sredy). Text in Russian. Gigiena i Sanit., no. 10:71-72, 1974. 15 refs.*

The uses of infrared spectroscopic methods for air and water pollutant analysis are reviewed. Vapors of polymethylsiloxane in air are determined at a sensitivity of 0.02 mg/ml at a 7.9 micron wavelength on the basis of the deformation vibrations of the carbon-silicon group. Alpha-methylstyrene is determined quantitatively at 11.23 micron at 0.05 mg/kg sensitivity. Lindane, extracted from air with isooctane, is determined spectrophotometrically at 14.6 micron, using a sodium chloride prism, at 0.05% sensitivity. Dibutylphthalate in air is determined at 5.6 micron at a sensitivity of 10 micrograms/ml. A lithium fluoride prism is used for the determination of 2,4-toluylene diisocyanate at 4.4 micron at 3 micrograms/ml sensitivity. Carbon tetrachloride and dichloroethane are determined at 12.7 and 13.3 micron, respectively, using cyclohexane as the solvent. The sensitivity amounts to 0.4 mg/ml. Infrared spectrophotometric methods are used for the determination of different exhaust gas components, such as sulfur dioxide, hydrogen sulfide, acetone, acetylene, propane, methanol, as well as carbon tetrachloride, benzene, carbon dioxide, carbon monoxide, methane, ethylene, and nitrous oxide in industrial waste gases.

49973 **APTIC NO. 72112**

Soma, Hiroharu

A MONITORING SYSTEM FOR SOURCES OF AIR POLLUTANTS BASED ON REGULATIONS OF THE TOTAL AMOUNT OF POLLUTANTS. *(Soryo kisei ni motozuku taiki osen hassei-gen kanshi shisutemu). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(10):74-77, Oct. 1974. 1 ref.*

The regulation of the total amount of pollutants refers to a method of calculating a permissible amount of pollutants to be discharged in an area consistent with the accomplishment of environmental standards. The monitoring system established in Chiba Prefecture consists of a system of monitors of the amount of air pollutants discharged from each factory and a communication system. With respect to data collection, each station is called in order with a request to send data by radio. After passing through a telemeter in the parent station, the data are processed by a computer. In the case of a monitoring system covering 100 factories, data are collected from all the stations within five min. There are chiefly four ways of processing calculations, including mean value processing, processing of data on the amount of flowing substance, and time rectification. For the communication computer, parent equipment consisting of a direction board and a receiver and transmitter is connected to each computer by means of an exclusive communication circuit of the Telegraphic and Communication Agency.

49974 **APTIC NO. 71836**

Tajiri, T.

MEASUREMENT TECHNIQUE OF AEROSOL WEIGHT CONCENTRATION. *(Earozoru no juryonodo sokuteiho). Text in Japanese. Kuki Seijo (Clean Air - J. Japan. Air Cleaning Assoc., Tokyo), 12(4):20-53, Oct. 1974. 139 refs.*

The accuracy of the weight concentration method depends on how the diffusion media (gas) and diffusion phase (aerosol) are separated, and on the efficiency of separation. Correction of the measurement for temperature, humidity, and atmospheric pressure is necessary when isokinetic sampling is applied. The location of sampling in exhaust duct is determined in the JIS Z 8808 method. As a general rule, bends and places with sudden changes of shapes and forms are avoided. A 5 in. difference in location of sampling can result in a 20% difference in concentration. Methods for the measurement of aerosol weight concentration including the dust tube method, cyclone sampling, high-volume sampler, high-volume cascade impacter, FKS low-volume air sampler, Hexhlet dust collector (Casella and Co. Ltd., England), Shibata low-volume sampler (air sampler with sedimenter), weight type dust sampler, SFI/Drager dust collector, Simgard portable sampler, Simpeds 70 MK 2 sampler, personal sampler, impinger, electrostatic precipitator, Gas dust automatic balance-recorder, piezoelectric-electrostatic mass concentration monitor, and radioactive dust sampler are described.

49975 **APTIC NO. 71554**

Towns, W. Barry and George C. Hofer

DESIGN CONCEPTS OF A MOBILE AIR MONITORING LABORATORY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., Pacific Northwest International Section, 27p., 1974. 17 refs. (Presented at the Air Pollution Control Association Pacific Northwest International Section Annual Meeting, Boise, Idaho, Nov. 17-19, 1974.)*

The design of a mobile air monitoring laboratory is discussed. A cost-benefit analysis was developed for determining the merits of supplementing an existing permanent site network with mobile capability. The design considerations are identical with fixed stations and include: instrument housing facilities, sample extraction and conveyance, instrument selection and installation, environmental control, and quality control measures such as operator maintenance, calibration, and data validation. Suggested performance specification for air monitoring instruments are tabulated for sulfur dioxide, carbon monoxide, photochemical oxidant corrected for nitrogen dioxide and SO_2, NO_2, and hydrocarbons corrected for methane.

49976 **APTIC NO. 72018**

Watanabe, Yasuo

DESIGN CONSIDERATION OF THE PROTOTYPE PARTICULATE INSTRUMENTATION BY LASER LIGHT SCATTERING (PILLS III) SYSTEM. *Tennessess Univ., Knoxville, Dept. of Electrical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 74-11,297, 109p. 1974. 52 refs.*

An electro-optical instrument for in-situ measurements of particulate density distribution based on laser light scattering by single particles was designed and tested. The design involved an in-line optical configuration (for collection of the forward scattered lobe) and an external sampling volume of large axial length, utilizing a gallium-arsenic laser as a source of infrared radiation. The initial design was tested on an optical bench and its response measured as a function of particle diameter and location. The output showed good agreement with theory and suggested the feasibility of a large external sampling volume. A source rejection filter was used to block residual light components, and a mechanical aperture was used to select a uniform intensity portion of the laser beam. A prototype was constructed using a Ga-As laser diode with a peak power of 25 watts. The main features of the prototype were: a rectangular output voltage response characteristic for a given particle, a mean output voltge which was approximated for water droplets and opaque droplets by two different mathematical expressions, minimum discernable particle sizes of 5 micron for water dorplets and 13 micron for opaque particles, and a sampling volume of 0.4 cu cm. The system precisely recovered the original density distribution for a realistic particle density distribution using calibration curves specifying the relationships between the particle diameter and the output voltage. (Author abstract modified)

49977 **APTIC NO. 72055**

Yamashita, Eiji, Katsumori Hata, and Shunsaku Jikihara

MEASUREMENT OF PARTICULATE MATTERS IN ATMOSPHERE. *(Taiki fuyufunjin sokutei ni kansuru kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):252, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 113.)*

Atmospheric particulate matter at Amagaski City is studied by using five different filter paper air samplers (one low volume, three medium volume, and one high volume). Trapping efficiencies of the different volume samplers are evaluated for total dusts and lead, cadmium, iron, manganese, and copper contents. Drying and weighing techniques are used to determine the total dust contents in air. Iron, manganese, and copper are determined by atomic absorption spectrometry after sample dissolution by aqua regia. Atomic absorption techniques are also used for lead and copper determinations after the diethyldithiocarbamic acid-methylisobutyl ketone extraction from aqua regia. The high volume sampler gave the largest value for total dust analysis (average value 128.2 micrograms/cu m), then medium volume samplers (89.0 micrograms/cu m), and low volume sampler (59.0 micrograms/cu m), respectively. For the Fe, Mn, and Cu analyses, the low and medium volume samplers trapped metal dust with almost these same efficiencies, but the samplers gave only 1/2 the efficiency of high volume samplers. All five samplers showed the same efficiency for lead and cadmium trapping. Concentrations generally found in air were 0.22 - 0.25 micrograms/cu m Pb, 0.003 - 0.004 Cd, 1.45 - 5.16 Fe, 0.09 - 0.18 Mn, and 0.005 - 0.012 Cu.

49978 **APTIC NO. 71687**

Yamate, N. and T. Matsumura

POLAROGRAPHIC DETERMINATION OF ACROLEIN IN AMBIENT AIR. *(Poraro gurafu ni yoru taiki-chu no akurorein no sokutei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution) 9(2):205, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 62.)*

A polarographic determination method for atmospheric acrolein was studied. Samples of various concentrations were prepared by adding given amounts of $CH_2{:}CHCHO$ to 200 l of air. The sample gas was passed at a flow rate of 1 l/min for 120 min through two absorption tubes containing ethyl alcohol as absorbent and placed in series. To the C_2H_5OH solution obtained, 1 M lithium chloride solution and 0.1 N hydrochloric acid as supporting electrolyte were added. The polarogram was obtained in the range of -0.7 V to 1.1 V at 10 C. From the wave-height at -0.93 V, the $CH_2{:}CHCHO$ concentration was obtained using a calibration curve. Results of polarographic determination were in agreement with those obtained by the 4-hexylresorcinol method. Atmospheric $CH_2{:}CHCHO$ concentrations measured on Aug. 1974 in Tokyo were in the range of 7-9 ppb by the polarographic method, but were undetected by the 4-hexylresorcinol method.

49979 **APTIC NO. 71742**

Yamato, Shigemitsu and Sadao Fujimoto

GAS ABSORPTION APPARATUS. *(Gasu kyushu sochi). Text in Japanese. (Nihon Kokan, Ltd., Tokyo (Japan)) Japan. Pat. Sho 49-43998. 2p., Oct. 26, 1974. (Appl. July 13, 1968, 1 claim).*

A gas analyzing device having a transparent or semi-transparent ball which is connected to a gas measuring tube through a pinch cock is described. The ball is chemical-proof, expansible, and compressible. The liquid in the ball and that in the gas measuring tube are exchangeable through the action of expansion and compression. Gas to be analyzed is led to the ball which contains absorbing liquid and the resulting gas is returned to the gas measuring tube or buret, and the change in volume is measured.

49980 **APTIC NO. 75269**

Yankovskiy, S. S., L. N. Tovgina, and Y. V. Abrosimov

PHOTOELECTRIC INSTRUMENT FOR MEASUREMENT OF DUST CONCENTRATION IN INDUSTRIAL GASES. *(Fotoelektricheskiy probor dlya kontrolya zapylennosti tekhnologicheskikh gazov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Tak 1, p. 26-27, Sept. 1974. 2 refs. Translated from Russian, 5p. (Entire report of TR 104-75 processed under APTIC 70040.)*

A photoelectric instrument for in situ dust concentration measurements in stack gases is described. The design of the instrument allows for zero correction without removal from the flue. The instrument consists of two optical heads, one of which includes a light source, a lens equipped with a diaphragm to regulate the light beam intensity, and a reference photocell. The second head consists of a condensing lens, a focusing lens, and a measurement photocell. The socket for a 40 watt lamp is attached to the bottom of a heat-dissipating housing such that the lamp position can be adjusted both in altitude and in radial direction. The measurement and reference photocells are connected to a bridge circuit. Field tests at a copper smelter, comparing the photelectric device with a gravimetric method revealed a dust meter reading spread of + or - 25% which corresponds to the spread usually observed in the absence of significant changes in particle size.

49981 **APTIC NO. 75274**

Yankovskiy, S. S. and A. A. Rusanov

JET SEPARATOR FOR DETERMINATION OF PARTICLE SIZE COMPOSITION OF INDUSTRIAL DUSTS. *(Struynyy separator dlya opredeleniya dispersnogo sostava promyshlennoy pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-6, Sept. 1974. Translated from Russian, 6p. (Also In: Peredovoy Nauchno-Tekhnicheskiy i Proizvodstvennyy Opyt, State Scientific Research Institute for Scientific and Technical Information (USSR), Rept. 12-68-1436/37. 5p., 1968.) (Entire report of TR 104-75 processed under APTIC 70040.)*

An eight-stage jet separator for the in situ determination of particle size composition of dusts in flue gases is described. The separator gives detailed information of the particle size composition for dusts in the 2-25 micron size range and also simultaneously determines the weight fraction of dust beyond this range. The gas jet passes through several nozzles installed in series, and the particles are deposited on grease-coated surfaces located opposite the nozzles. The apparatus is inserted into the flue so that the direction of the tip coincides with the direction of gas movement. After heating to the gas temperature, the jet separator is turned by 180 deg so that the tip is directed against the gas flow. An amount of gas sufficient for the accumulation of 20-30 kg dust in the individual stages is drawn through the apparatus at a rate of 10 l/min. The apparatus is then removed from the flue, and the filter and disks are weighted in an analytical balance.

49982 **APTIC NO. 75279**

Yankovskiy, S. S., A. A. Rusanov, and Y. V. Abrosimov

MULTISTAGE IMPACTOR FOR GRAVIMETRIC PARTICLE SIZE ANALYSIS OF SOLID PARTICLE AEROSOLS. *(Mnogostupenchatyy impaktor dlya vesovogo dispersnogo analiza aerozoley iz tverdykh chastits). In: Development of Metholdolgy and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 3-5. Translated from Russian, 3p., (Also: Russ. Pat. 261772.) (Entire report of TR 104-75 processed under APTIC 70040.)*

A six-stage impactor for gravimetric particle size analysis is described that handles higher gas temperatures and dust concentrations than prior-art multistage impactor devices. The invention is distinguished by the fact that a filter cassette, filled with a heat-resistant material, is mounted opposite each accelerating nozzle. Each of the filter cassettes is equipped with a suction channel such that particles settling on the surface of the filter are trapped. After sample collection, particle size composition of the dust is calculated on the basis of the weight gain of the filters.

49983 **APTIC NO. 75280**

Yankovskiy, S. S. and N. A. Fuks

METHOD OF DETERMINATION OF AEROSOL PARTICLE SIZE COMPOSITION. *(Sposob opredeleniya dispersnogo sostava aerozoley). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Enbironmental Agreement, Proj. A-4, Task 1, p. 6-8, Sept. 1974. Translated from Russian, 3p., (Also: Russ. Pat. 161963.) (Entire report of TR 104-75 processed under APTIC 70040.)*

A method for the determination of aerosol particle size composition without disruption of particle aggregations is described. The aerosol sample is passed through two or more separating devices with different efficiencies. A filter is located at the outlet of the last device. Previously plotted nomograms of the entrainment capacities of the separators are used to determine the aerosol particle size composition.

49984 **APTIC NO. 71699**

Yavorovskaya, S. F.

DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN THE AIR BY GAS-CHROMATOGRAPHIC METHOD. *(Opredeleniye politsiklicheskikh aromaticheskikh uglevodorodov v vozdukhe metodom gazovoy khromatografii). Text in Russian. Gigiena i Sanit., no. 10:72-74, 1974. 7 refs.*

Methods currently available for the gas-chromatographic analysis of polycyclic aromatic hydrocarbons in the air are reviewed. A silicate SE-30-filled column with an electron capture detector of benzene and alcohol extracts gives a sensitivity of 0.01 microgram. Lithium chloride on chromosorb P and a temperature- programmed column have been used. Direct extract analysis with a flame ionization detector was used for the determination of benzo(a)pyrene and 1,2,5,6-dibenzoanthracene. A similar method was applied for the determination of pyrene, chrysene, benzoanthracene, and benzoperylene. Mixtures of benzo(a)pyrene, 3,4-benzofluoranthene, and 2,3-phenylpyrene were determined by thin-layer and column chromatographic separation. The limit of detectability amounted to 2 nanograms for benzo(a)pyrene. Using filled and capillary columns for adsorption and a flame-ionization detector, it was possible to measure fluoranthene, pyrene, benzofluorene, 3-methylpyrene, benzoanthracene, chrysene, benzofluoranthene, 4-5-benzopyrene, and 1,2-benzopyrene in the air of Rome. The combination of gas chromatographic and mass spectrometric methods is suitable for the identification of many polycyclic aromatic hydrocarbons in the air.

49985 **APTIC NO. 71579**

(Inventor not given.)

NITROGEN DIOXIDE CONVERSION. *(Beckman Instruments, Inc., Fullerton, Calif.) Brit. Pat. 1,360,527. 3p., July 17, 1974. (Appl. March 27, 1972, 5 claims).*

A method for converting nitrogen dioxide to nitric oxide for use in the quantitative measurement of NO2 in gas streams is described. Nitrogen dioxide at atmospheric pressure and at a temperature between 40 and 130 C is exposed to ultraviolet radiation (1849-6600 A) for conversion to NO. Unlike prior-art thermal decompositions between 670 and 750 C, conversion between 40 and 130 C allows for the determination of NO2 even at levels found in polluted atmospheres.

49986 **APTIC NO. 71846**

(Inventor not given.)

IMPROVEMENTS IN OR RELATING TO THE DETECTION OF ATMOSPHERIC POLLUTANTS. *(Dept. of Armed Forces, Paris (France)) Brit. Pat. 1,360,317. 6p., July 17, 1974. (Appl. July 10, 1972, 17 claims).*

A flame photometric method for the detection of volatile atmospheric pollutants, particularly phosphorus compounds, is described that utilizes a double flame arrangement in combination with excess hydrogen to obtain the sensitivity required for ambient monitoring. The sample is first heated to volatilize any liquid or solid compounds and is then filtered. The sample is then drawn through a central nozzle of a hydrogen burner in a combustion chamber. Hydrogen is supplied through an annular nozzle surrounding the central nozzle. The flame produced is studied with the aid of an interference filter. The relative flow rates of hydrogen and the sample are then adjusted to obtain an excess of hydrogen with respect oxygen content of the sample, with the excess hydrogen at a nozzle located downstream of the central and annular nozzles being burned to produce another hydrogen flame. The passband of the filter used for the detection of volatile phosphorus compounds is centered on a wavelength of 526 millimicron.

49987 **APTIC NO. 71864**

(Inventor not given.)

SULFUR DIOXIDE CONCENTRATION MEASUREMENT. *(Atomic Energy Commission, Washington, D. C.) Brit. Pat. 1,359,406. 5p., July 10, 1974. (Appl. Nov. 13, 1972, 12 claims).*

An electrochemical device for measuring the ambient sulfur dioxide concentrations is described that minimizes prior-art disadvantages relating to chemical interferents, apparatus complexity, and cost. The elctrochemical meter includes: a means containing a molten fused electrolyte consisting of at least two sulfate salts of lithium, potassium, or sodium; a means for supplying a reference gas containing oxygen and a fixed SO2 concentration to a first portion of the free surface of the electrolyte; a means for supplying a sample gas containing oxygen and some unknown concentration of SO2 to a second portion of the free surface of the electrolyte; electrically conductive means extending into the first and second portions of the electrolyte; a barrier, porous to the cation of the electrolyte, which extends into the electrolyte and segregates the reference and sample gases; and a means for measuring the electromotive force across the conducting means.

49988 **APTIC NO. 71871**

(Inventor not given.)

IMPROVEMENTS RELATING TO CONDENSATION NUCLEI METERS. *(Environment/One Corp., Schenectady, N. Y.) Brit. Pat. 1,360,223. 16p., July 17, 1974. (Appl. July 21, 1971, 12 claims).*

An apparatus for measuring condensation nuclei concentration is described that, unlike prior-art devices, is easily transported and provides linearly calibrated output measurement scales to facilitate size measurement. The condensation nuclei counter includes: a condensation chamber, an electro-optical means for viewing the interior of the condensation chamber and deriving an electrical output signal representative of the production of liquid droplets, a manually operable pump for flushing the condensation chamber and supplying a sample to be monitored at 100% relative humidity, a manually operated valving means for isolating the condensation chamber during the expansion cycle, a means for suddenly expanding the volume of the condensation chamber at a rate sufficient to supersaturate a specimen of humidified atmosphere, and a measuring circuit coupled to the electro-optical means for measuring the value of the output signal which reflects the number of entrained condensation nuclei particles.

49989 **APTIC NO. 72015**

American Society for Testing and Materials, Philadelphia, Pa.

TENTATIVE METHOD FOR AUTOMATED SEPARATION AND COLLECTION OF PARTICULATE AND ACIDIC GASEOUS FLUORIDE IN THE ATMOSPHERE (DOUBLE PAPER TAPE SAMPLER METHOD). *Book ASTM Stand., no. 26: 715-720, 1974. 14 refs.*

A tentative method for the automated separation and collection of particulate and acidic gaseous fluoride in the atmosphere by means of a double paper tape sampler is described. Air is drawn through an air inlet tube and is first passed through an acid-treated prefilter paper tape to remove any particulates which may contain fluoride and then through an alkali-treated paper tape to remove acidic fluoride gases. Exhaust air is filtered through soda lime-glass wool, and the cleaned air is used to pressurize the front compartment to prevent fluoride contamination of the paper tapes from the ambient air. At the end of the preset sampling period (several minutes to 3 hr), the vacuum pump is automatically turned off, and the tapes are indexed. The paper tapes are removed from the sampler and analyzed by potentiometric or photometric methods. Possible interferences include: particulate metallic salts, acid aerosols or gases, and phosphates or metals such as aluminum. The relative standard deviation of hydrogen fluoride determination is about 16% for the 1-3 micrograms/cu m range and about 5% for the 12-45 micrograms/cu m range. Recoveries of hydrogen fluoride are better than 95% with amounts of fluorides of up to 40 micrograms and at sampling periods of 15-120 min. The precision and accuracy of particulate fluoride determinations are not yet established.

49990 **APTIC NO. 72110**

Japan Society for the Study of Offensive Odors

TRAINING INSTITUTE TEXT BOOK ON OFFENSIVE ODOR MEASUREMENT, NO. 2. *(Akushu sokutei kenshu kai tekisuto, No. 2). Text in Japanese. 40p., 1972.*

Five substances including ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine were listed as odorous compounds in the bad odor prevention law issued on May 31, 1972. Ammonia was sampled with 20% sulfuric acid-impregnated fiber glass filter paper. The filter paper was washed with water and the pH of the washing liquid was adjusted to 3.7 with 0.1 N sodium hydroxide solution. After the additions of sodium acetate buffer, pyridine-pyrazolone solution and chloramine T solution, the solution was extracted with chloroform and the absorbance of the extract near 450 nm was measured. Methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine were analyzed by gas chromatography with flame photometric detector and flame ionization detector. Environmental standards for the odors in industrial areas are as follows: ammonia, 2-5 ppm; methyl mercaptan, 0.004-0.01 ppm; hydrogen sulfide, 0.06-0.2 ppm; methyl sulfide, 0.05-0.2 ppm; trimethylamine, 0.02-0.07 ppm.

49991 **APTIC NO. 72124**

Pollution Atmospherique de l I.N.S.E.R.M.

CONTRIBUTION TO THE DETERMINATION OF SULFUR DIOXIDE ON DRY ADSORBENT: APPLICATION TO POLLUTED AIR. STUDY OF THE SPECIFICITY. COMPARISON WITH THE STRONG ACIDITY METHOD. *(Contribution a la determination du dioxyde de soufre sur absorbant sec: application aux atmospheres polluees. Etude de la specificite. Comparaison avec la methode a l acidite forte). Text in French. Tribune CEBEDEAU, (Centre Belge Etude Doc. Eaux), 27(366):255-259, May 1974. 6 refs.*

The specific colorimetric method using dry zinc acetate for the determination of sulfur dioxide in the air was compared with the strong acidity method according to the French Patent AFNOR NF 43005. Air is sampled through a filter treated with zinc acetate for 24 hr, after which extraction is done by means of pyridine-nitroprussiate reagent and zinc acetate solution in glycerin for subsequent photocolorimetric determination. Compared with the strong acidity method, the specific colorimetric method shows an SO_2 deficit especially if sampling is conducted for over 24 hr, and for SO_2 concnentrations below 100 micrograms/cu m. A correlation coefficient of 0.85 was established.

49992 **APTIC NO. 72156**

(Inventor not given.)

METHOD FOR MEASURING NITROGEN OXIDES IN POLLUTION AIR AND DEVICE FOR PERFORMING THE SAME METHOD. *(Sagami Chemical Research Center, Tokyo (Japan)) Brit. Pat. 1,366,235. 15p., Sept. 11, 1974. (Appl. May 14, 1973, 18 claims).*

A method and apparatus for measuring ambient levels of nitrogen dioxide and/or nitric oxide without the interference problems associated with prior art methods are described. Quantitative analysis of NO and/or NO_2 is performed on the basis of the strength of the gas phase electron paramagnetic resonance spectrum of the species. The gas sample is inserted into an X band EPR cylindrical TEoln mode cavity resonator provided with Zeeman modulation coils for the detection of NO_2 and Stark electrodes for the detection of NO. The required sample volume varies between 10-500 cc. The method is applicable to the continuous automatic monitoring of NO and/or NO_2.

49993 **APTIC NO. 75271**

DETERMINATION OF GAS HUMIDITY. *(Opredeleniye vlazhnosti gazov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 334-344, Sept. 1974. Translated from Russian, 14p. (Entire Report of TR 104-75 processed under ATPIC 70040.)*

Methods for determining the humidity of stack gases during the evaluation of dust collecting equipment are reviewed. Techniques covered include: the absolute weight method, the absolute manometric method, humidity determination by temperature differences of dry bulb and wet bulb thermometers, and humidity determination by observation of dew formation on a cooled surface. Humidity determination by the absolute weight method is quite accurate but laborious to perform. The absolute manometric method is rarely used since the mousture absorption process is almost always accompanied by thermal effects which can lead to error. Regardless of the method used, dust must not be allowed to get into the instrument since this either distorts the the results or soils the instrument.

49994 **APTIC NO. 75273**

DETERMINATION OF ACTUAL DUST DENSITY. *(Opredeleniye istinnoy plotnosti pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-30, Sept. 1974. Translated from Russian, 30p. (Entire report of TR 104-75 processed under APTIC 70040.)*

Methods for the determination of various dust particle parameters are reviewed. Techniques covered include: dust density determinations (pycnometric and manometric methods); particle size analysis (sieve analysis and sedimentation); and specific surface measurement (air permeability). The manometric method of density determination is more acceptable than the pycnometric method since the complete removal of air from the half-closed pores of the powder being studied is difficult in the latter method. The comparative characterization of particle size by specific surface determination is useful for fine particles (1-2 micron) which do not lead themselves to methods of direct size determination.

49995 **APTIC NO. 75278**

BASIC EQUIPMENT OF DUST AND GAS LABORATORIES (SAMPLE LIST). *In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-13, Sept. 1974. Translated from Russian, 13p., (Entire report of TR 104-75 processed under APTIC 70040.)*

Measurement devices for determining the parameters necessary for evaluating the efficiency of dust separator operations are tabulated. The following categories are covered: pressure measurement devices (manometers); particle size measuring instrumentation (sieves, sedimentation balances, centrifugal separators); velocity measurement instrumentation (e.g., flowmeters); temperature measuring devices (e.g., thermocouples); particulate and gas analyzers; and devices for gas humidity measurements. A list of parameters which are most important for ensuring successful operation of dust separators is also presented.

1973

49996 **APTIC NO. 69538**

Albersheim, Steven R. and John E. Lewis

EVALUATION OF A HI-VOL SAMPLING NETWORK FOR FORECASTING POLLUTION POTENTIAL IN A SUBURBAN AREA. *Preprint, World Meterorological Organization and World Health Organization, 10p., 1973. 9 refs. (Presented at the World Meteorological Organization and World Health Organization Technical Conference on the Observation and Measurement of Air Pollution, Helsinki, Finland, July 30- Aug. 4, 1973.)*

The representativeness of the hi-vol sampling network in Prince Georges County, Maryland, with respect to the air quality standards established by the Environmental Protection Agency was evaluated by examining the environmental and meteorological conditions at each measurement site. The hi-vol sampler determines the concentration of suspended particulate matter by drawing air through a glass fiber filter of known weight. The reweighing of the filter gives a direct measurement of the particulate mass for a unit time. The pollution potential as indicated in the Brandywine, Hall, and Oxon Hill regions was questionable due to the location of the hi-vol samplers near a highway and agricultural activity. Oxon Hill had concentration levels of suspended particulate matter greater than expected for a residential area due to the nearness of highways. The mass loading of particulate matter at Cheverly did not reflect the industrial and commercial activity surrounding the sampler due to the location of the sampler on top of an eight-story building, above the primary sources of pollutants in the county (automobile). The pollution potential on the outer fringes of the county (Brandywine and Hall) was of limited representativeness due the proximity of the hi-vols to major highways and agriculture activity. The distribution patterns of suspended particulate matter tended to indicate general areas of the county where pollution exists. During periods of wind persistence, it was possible to forecast a distribution pattern. Caution must be taken when inferring spatial distribution patterns because of the possible predominance of local environmental conditions.

49997 **APTIC NO. 71913**

Lawrence, N. L. W.

HYDROCARBON EFFLUENT ANALYSIS BY FLAME IONIZATION DETECTION. *Can. Controls Instrum., 12(9):15-16, Sept. 1973.*

An advanced flame ionization detection technique for the measurement of hydrocarbon emissions from sources such as diesel engines and incinerators is described. The advanced burner utilizes a fuel pre-mixture system (hydrogen and air) with higher velocity flow rates. The heat loss from the reaction zone to the burner is greatly reduced; and a smaller, more evenly-shaped flame is obtained by forcing the flame away from the ceramic burner tip. The introduction of a small flow of additional air to the sample flow allows the core of the flame to become saturated with oxygen molecules so that any oxygen in the sample flow does not cause oxygen errors. Interference from oxygen is less than 0.5%. The ionization degree efficiency of the hot flame produced is very high, and a sample flow rate of 20 cc/min (from a by-pass of approximately 6 l/min) can be used. The jet effect of the hot flame enables both light and heavy hydrocarbons to be burnt, even when exposed to the flame for a very short period of time. The higher flame core temperature also allows a much higher ionization of oxygenated hydrocarbons and complex groups.

49998 **APTIC NO. 71918**

Linford, Gary J.

ZEEMAN-TUNED LASER DETECTS AIR POLLUTION. *Microwaves, 12(12):52, 54, 56-57, Dec. 1973. 2 refs.*

The application of a continuous-wave, Zeeman-tuned xenon laser in the spectrophotometric detection of such ambient air pollutants as nitric oxide, nitrogen dioxide, sulfur dioxide, peroxyacetyl nitrate, carbon monoxide, ozone, and formaldehyde is described. Such measurements can be conducted over a long optical path passing through polluted air or in the laboratory. The magnetic tuning of the xenon device permits the comparison between xenon laser lines and pollutant-gas absorption lines. The ratio is fed into a data processing system (an autolock amplifier, a direct current reference amplifier, a digital ratiometer, and a chart recorder) to determine the amount of pollution. Relative concentrations of formaldehyde, for example, of less than 10 to the minus 7 appear to be detectable with present equipment operating over a 15-kilometer round-trip path through the atmosphere.

49999 **APTIC NO. 72017**

Prinz, B.

APPROACHES AND RESULTS OF AN EFFECT MONITORING-PROGRAMME IN THE STATE NORDRHEIN WESTPHALIA. *World Meteorological Organization and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Measurement Atmos. Pollut., Helsink, Finland, 1973, p. 223-235. 1974. 10 refs. (July 30-Aug. 4, Paper 368.)*

An effect monitoring program was conducted in Nordrhein Westphalia to measure the effect of pollutants on a set of indicators. Three groups of indicators were applied: effect observations by use of exposed lichens, wood, and metal patterns representing the biological and technical part of the environment; uptake of pollutants by the biosphere by use of standardized grass cultures; and uptake of pollutants by standardized materials by use of massflow proportional measuring devices. The mortality rate of the lichen area was determined in percent of the undamaged area at the beginning of the exposure. The mortality rates range from 0 to 38% comparable with 0% at a site in nonindustrial area and 84% at a site in Duisburg, both outside the surveyed region. Grass cultures were exposed under standardized conditions to sulfur, fluorine, chlorine, lead, zinc, and cadmium. All sites showed a considerable and widespread amount of S uptake. The correlation coefficients between S uptake and the uptake of the other five compounds reflect the emission situation in the area. The correlations and partial correlations between sulfur dioxide concentrations, IRMA-data (mass stream proportional uptake of a pollutant), and uptake of S by grass are more significant for the effect-related uptake by grass than the concentration values.

1972

50000 **APTIC NO. 71916**

Beck, R. and W. Englisch

GAS ANALYSIS USING LASERS. *Eur. Elec. Opt. Markets Tech. Conf., Proc., 1st, Geneva, Switzerland, 1972, p. 276-283. 6 refs. (Sept. 13-15.)*

The application of lasers to measurements of emissions and airborne pollutants is reviewed. The three basic spectrophotometric methods of gas analysis with lasers are Raman scattering measurements, resonance fluorescence measurements, and resonance absorption measurements. Raman Scattering measurements necessitate very powerful pulsed lasers who emission is in the ultraviolet, while resonance absorption measurements are performed with tunable infrared lasers which do not have to meet any specific requirements regarding the energy or power produced. Resonance fluorescence measurements require tunable lasers with a high pulsed output. The method of resonance absorption is particularly sensitive; the absorption cross-sections are about 12 orders of magnitude larger than the corresponding Raman scattering cross-sections. Furthermore, infrared molecular lasers can be tuned to many emission lines; hence, there is almost always adequate coincidence between an emission line and an absorption line from a molecular gas to be analyzed. Limits of detection for emission measurements with lasers are tabulated for sulfur dioxide, hydrogen sulfide, nitrogen dioxide, hydrogen chloride, carbon monoxide, and hexane. Detection limits for ambient measurements are also specified for SO2, H2S, NO2, HCl, and CO.

50001 **APTIC NO. 71914**

Birkle, M.

APPLICATION OF LIDAR FOR MEASUREMENTS IN ENVIRONMENTAL PROTECTION AND IN METEOROLOGY. *Eur. Elec. Opt. Markets Tech. Conf., Proc., 1st, Geneva, Switzerland, 1972, p. 34-40. 26 refs. (Sept. 13-15.)*

The application of lidar to air pollution and meteorological measurements is reviewed. Lidar offers the possibility of directly observing the build-up of haze layers as a pre-stage of smog; inversion limits can be determined if there is a rise of dust density over congested areas or if there is an occurrence of fog or clouds in the area. The aerosol concentration in the upper layers of the atmosphere can also be determined by lidar, with heights up to 100 km being attainable under conditions of good visibility. Transmission measurements of smoke

plumes are possible for distances below 1 km. A lidar shot is made through the plume, and the two-way attenuation of the energy by the plume is measured. For reflection measurements, the target signal is evaluated directly. As compared to transmission measurements, less intensity problems are encountered since the target signals of smoke plumes received over distances of several km still have a satisfactory signal-to-noise ratio. Developments in the field of tunable lasers show promise for expanding the application of lidar to air pollution measurements.

50002 **APTIC NO. 67985**

Vol fson, V. Y., O. S. Zanevskaya, A. N. Korol, P. P. Ruban, and O. T. Chugayeva

DETERMINATION OF TRACE IMPURITIES IN AROMATIC HYDROCARBONS IN AIR. *(Opredeleniye mikroprimesi aromaticheskikh uglevodorodov v vozdukhe). Text in Russian. Nov. Sorbenty Khromatogr., no. 18:87-89, 1972. 4 refs.*

Procedure for the sampling and gas-chromatographic determination of trace quantities of benzene, toluene, ethylbenzene, and styrene in concentrations of 0.001-0.0001 cu cm/cu m is described. The hydrocarbons are sampled by adsorption on a squalene-imbued carrier cooled to very low temperature by a mixture of dry ice and acetone or chloroform with liquid nitrogen. Then the trap is heated at 140 C in an oven for 2 min for the determination of the released hydrocarbons on chromosorb W 80-100 mesh-filled column with polyethyleneglycoladipinate in a ratio of 0.2:10. The column temperature is 65 C. The rate of recovery ranges from 70 to 80% for benzene, and from 97 to 99% for the other aromatics.

1971

50003 **APTIC NO. 71899**

Volberg, N. S.

COULOMETRIC METHOD FOR THE DETERMINATION OF HALOGENATED COMPOUNDS IN THE AIR. *(Kulonometricheskiy medod opredeleniya galogensoderzhaschikh soyedineniy v vozdukhe). Text in Russian. Gl. Geofiz. Observ. Leningrad, no. 254:162-171, 1971. 9 refs.*

A coulometric method and experimental automatic instrumentation for the determination of free halogens, hydrochloric acid, and chlorinated hydrocarbons are described. Multilayered silver crystals on a graphite core are used as electrodes for the coulometric cell. A 25% solution of lithium chloride with 0.02% lithium bromide and 4% acetamide is used as the electrolyte. For determination, the air sample containing free chlorine is introduced directly into the electrolyte, while the determination of hydrochloric acid requires preliminary oxidation on silichrom-3 containing 20% potassium bromate and 5% lithium chloride. Chlorinated hydrocarbons are determined following incineration of platinum-coated, macroporous silica gel, at 700-800 C, and oxidation with potassium bromate. A cartridge containing a mixture of potassium carbonate with sodium thiosulfate on a porous carrier is used to remove chlorine and hydrochloric acid during the determination of chlorinated hydrocarbons.

1970

50004 **APTIC NO. 68205**

National Aeronautics and Space Administration, Technology Utilization Program

SENSITIVE CHEMILUMINESCENT OZONE DETECTORS. TECHNICAL SUPPORT PACKAGE FOR NASA SP-5957(02) (GSC-11433). *20p., 1970 (?). 6 refs.*

The development of a chemiluminescent ozone detector comprised of rhodamine-B and gallic acid absorbed on a Vycor or silica gel disc is discussed. Exposure of the disc to ozone results in the chemiluminescent emission of light. The addition of gallic acid improves the disc by heightening its sensitivity. This detector may be used to measure the ozone content in the upper atmosphere. The discs are from 10 to 100 times more sensitive than those previously available. The quantum yield of the most sensitive disc is estimated to be 0.000002 photons/incident molecule. The minimum detectable ozone flux is approximately 10 to the 11th power molecules/min. Over 100 detector discs of various configurations and characteristics were fabricated and tested. The capability now exists to produce state-of-the-art quality detectors with good repeatability and uniformity.

AIR QUALITY MEASUREMENTS

1975

50005 **APTIC NO. 71958**

Hanst, Philip L., William E. Wilson, Ronald K. Patterson, Bruce W. Gay, Jr., Lucian W. Chaney, and Charles S. Burton

A SPECTROSCOPIC STUDY OF CALIFORNIA SMOG FINAL REPORT. *Environmental Protection Agency, Research Triangle Park, N. C., Rockwell International, Thousand Oaks, Calif., and National Environmental Research Center Proj. 21AKB-13, Program Element 1AA008, 69p., 1975 (?). 32 refs.*

Long-path infrared spectroscopic studies of the composition and chemistry of smog in the Pasadena, California area were performed during November 1972 and the summer of 1973. Infrared radiation was transmitted along a 417-meter path folded between mirrors in a 9-meter long glass tube, and spectra of polluted air were recorded with a Fourier transform spectrometer system. During the fall of 1972 the level of automobile exhaust pollution was high in the morning and evening, though there was very little formation of ozone and other oxidation products in the air. During the summer of 1973 the morning and evening pollution levels were generally not as high as in the fall; but the stagnation of daytime air led to the formation and observation of ozone, peroxyacetyl nitrate, formic acid, and other oxidation products. Concentration maxima of 0.68 ppm ozone, 0.07 ppm formic acid, and 0.05 ppm peroxyacetyl nitrate were recorded on July 25, 1973. Also measured were hydrocarbons, chlorinated hydrocarbons, carbon monoxide, and methanol. Spectral analyses indicated that nitric acid vapor was not present in the smog at concentrations higher than 10 ppm and that ammonia was not present at concentrations higher than 5 ppm. (Author abstract modified)

50006 **APTIC NO. 72404**

Penkett, S. A., F. J. Sandalls, and J. E. Lovelock

OBSERVATIONS OF PEROXYACETYL NITRATE (PAN) IN AIR IN SOUTHERN ENGLAND. *Atmos. Environ., 9(1):139-140, Jan. 1975. 6 refs.*

Peroxyacetyl nitrate levels in non-urban areas of southern England were measured with a gas chromatograph calibrated against known concentrations in the range of 10-50 ppb by volume. The maximum concentration of PAN was 2.3 ppb. Good correlation between the concentration of PAN and ozone was observed on a sunny, anticyclonic day. Further measurements are required to determine the source of PAN in the rural area examined.

50007 **APTIC NO. 72362**

Wilkniss, P. E., J. W. Swinnerton, R. A. Lamontagne, and D. J. Bressan

TRICHLOROFLUOROMETHANE IN THE TROPOSPHERE, DISTRIBUTION AND INCREASE, 1971 TO 1974. *Science, 187(4179):832-834, March 7, 1975. 12 refs.*

50008

Measurements of trichlorofluoromethane, an exclusively man-made compound used mainly as an aerosol propellant, were made in the troposphere over the Pacific Ocean during 1972 and 1974 and were compared with each other and previous measurements of the same compound made over the Atlantic Ocean in 1971. The mean aerial concentrations for CCl3F in 1971, 1972, and 1974 were 50, 61, and 80 ppt (parts per trillion), respectively. An increase in the atmospheric level of 22% from November 1971 to November 1972 was calculated along with a 31% increase from November and December 1972 to March and April 1974. Overall, the increase from November 1971 to March and April 1974 was 60%. The increases are proportional to the increase of industrially produced amounts of CCl3F during the same time period.

1974

50008

APTIC NO. 69254

Abe, Koshi, Hidehiko Hoshikawa, and Toshihiko Seiki

INVESTIGATION RESULTS OF HYDROGEN SULFIDE CONCENTRATION BY THE CYLINDER METHOD. *(Entoho ni yoru ryuka suiso nodo chosa kekka). Text in Japanese. Sendai-shi Eisei Shikensho-ho (Sendai Munic. Rept. Inst. Pub. Health), no. 4:101-104, Oct. 1974.*

The concentration of hydrogen sulfide in the air was measured at five locations in the background area of the Sendai Harbor, where a petroleum refinery with an annual capacity of 120,000 barrels has been operating since July 1971. The results of H2S measurements between May 1971 and December 1972 are presented in a table. The method of measurement was a cylindrical cumulative device. A piece of broad cloth was soaked in zinc acetate liquid and was pasted on a ceramic cylinder and dried. The cylinder was hung in a screen box for 30 days. The cloth was taken off at the end of the period and was soaked in 20 ml of water, 7 ml of hydrochloric amine was added and stirred, and 1.4 ml of ferric chloride solution was added. The color turned blue according to the concentration of H2S. The solution was shifted to a colorimetry tube and distilled water was added; photometric absorption was measured at 660 mn. The annual averages for 1971 were 0.33 or 0.34 for four of the locations; but at the Nakano District, it was 0.62. The district is adjacent to the factory area around the harbor and has been exposed to petroleum refinery exhausts, and perhaps evaporation from the sewage treatment plant across the river but the cause was not clear. In all locations, monthly fluctuations were great, and there was no seasonal pattern for H2S measurements.

50009

APTIC NO. 69747

Akiyama, Kazuyuki, Chikaji Nagashima, Rieko Takashi, Kazumasa Fujiya, Hiroshi Noushi, and Mamoru Nagasaki

DETERMINATION OF ATMOSPHERIC POLYNUCLEAR AROMATIC HYDROCARBONS IN METROPOLITAL TOKYO. *(Tokyoto nai ni okeru taikichu takan hokozoku tankasuiso no sokutei). Text in Japanese. Preprint, Japanese Society of Public Health, Fukushima, p. 417, 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 547.)*

Airborne dust particulates were collected at four sites in Metropolitan Tokyo, from July to December 1973, and analyzed for benzo-a-pyrene (Bap) and benzo-ghi-perylene (B(ghi)p). High-volume air samplers were used to collect the samples, which were then analyzed by gas chromatography. The average Bap concentration (including benzo-e-pyrene) was 28.6 micrograms/1000 cu m average B(ghi)p concentration was 11.5 micrograms/1000 cu m. However, one site had above-average concentraions of Bap (60.7 micrograms/1000 cu m), and B(ghi)p (16.8 micrograms/1000 cu m).

50010

APTIC NO. 71705

Amaya, Kazuo

A SURVEY OF NO2 AIR POLLUTION AROUND THE KAN-NANA ROAD (CIRCULAR ROAD NO. 7) IN TOKYO. *(Kogata hoshukan ni yoru Kan-nana ensen no NO2 taiki osen chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2).498, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 344.)*

With the cooperation of residents around circular road No. 7 supported by a unique movement organized by citizens, the nitrogen dioxide concentration near the road was measured at 1500 measuring points for three days in June. The sample was collected for 24 hrs in a small plastic sampling tube with chromatographic filter paper immersed in triethanolamine solution as an absorbent and placed around the inner wall of a plastic tube. The NO2 was determined by colorimetry. The data are given in ppm/day, calculated by setting 5 micrograms of NO2 as 0.1 ppm/day. The NO2 measured by the small sampling tube method was 0.040-0.048 ppm in Ohta and 0.050-0.080 ppm in Suginami, compared to 0.035-0.049 ppm in Ohta and 0.058-0.070 ppm in Suginami measured by an automatic measurement device and 0.035-0.043 ppm in Ohta and 0.040-0.050 ppm in Suginami measured using a double-layer nylon net holder. In all areas, the NO2 concentration far exceeded the environmental standard of 0.02 ppm, indicating the seriousness of NO2 pollution.

50011

APTIC NO. 72025

Asakuno, Kunihiko

MEASUREMENT OF AEROSOL PARTICLE CONCENTRATION. *(Earozoru no kosunodo sokutei). Text in Japanese. Kuki Seijo (Clean Air- J. Japan Air Cleaning Assoc. (Tokyo)), 12(4):54-60, Oct 1974. 14 refs.*

Measurement of submicron aerosol was carried out at Tokyo Tower by using a Pollack counter and diffusion box. The aerosol concentration was high at the altitude of 25 m between 10:00 and 10:30 am when traffic was heavy. The particle size was in the 0.02-0.05 micron range, which showed that the distribution was that of Junge. At the altitude of 127 m, more new particles were supplied from the surrounding areas. Studies were also conducted on the relationship between the physical characteristics of the aerosols and visibility, using the light scattering method and isothermal expansion method. Results obtained on the roof of Rissei high school during July-August 1972 showed that the number of aerosol particles larger than 0.3 micron was inversely proportional to visibility while there was no apparent relationship between the two for submicron particles. The submicron particle concentration was found generally high at 10,000 - 100,000 particles per cu m.

50012

APTIC NO. 72391

Bolanca, Z.

STUDY OF BACKGROUND POLLUTION OF AIR AND PRECIPITATION. *(Ispitivanje prirodnog fona zagadenosti zraka i oborina). Text in Serbo-Croatian. Arhiv. Hig. Rada Toksikol. (Yugoslavia), 25(2):201-205, 1974.*

A speical network of four air quality monitoring stations were installed in different parts of Yugoslavia in response to recommendations of the World Meteorological Organization. Monthly samples of air and precipitation revealed large differences in the concentrations of ammonium, nitrate, sulfate, and calcium ions between the four stations. Summer versus winter concentrations were particularly divergent. Large quantities of chlorides and sodium and magnesium ions were also measured at one of the monitoring stations.

50013

APTIC NO. 71552

Fankhauser, Robert K.

OZONE LEVELS IN THE VICINITY OF 33 CITIES. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Quality Assurance and Environmental Monitoring Lab., 25p., 1974 (?). 9 refs.*

Hourly concentrations of ozone were measured by the chemiluminescence method during the summer of 1971 in the vicinity of 33 cities. A listing was made of the percent of time the National Air Quality Standard for photochemical oxidants was violated. Maps showing the geographical distribution of O3 are included. The data are related to wind direction to determine the source areas. The center of the city with its heavy traffic was the source of most of the O3 measured at downtown sites. Times when concentrations were 120 micrograms/cu m or more were investigated more completely at four selected cities. Numerous occasions of high O3 concentrations occurred when wind directions were apparently from areas with low concentrations of known precursors. Other sources of O3 were considered, such as thunderstorms and the transport of O3 for long distances. Examples of O3 concentrations during thunderstorms and related to long distant transport are cited. (Author abstract modified)

50014 **APTIC NO. 71756**

Fujitani Y. and H. Mizuno

FREQUENCY DISTRIBUTION OF POLLUTANT CONCENTRATIONS IN NAGOYA DISTRICT. *(Nagoya chiku ni koeru osenbutsu nodo no hindo bunpu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 9(2):510, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 357.)*

Results of continuous measurements of pollutants conducted by the Toyota Co. throughout 1973 at one monitoring station are described. For each component pollutant, change in concentrations with respect to time of year, month, season, ad frequency distribution of pollutant concentrations were analyzed. Because the monitoring station was near the center of the city, the effect of automotive emissions on the data is marked. Average daily values of pollutants were: nitrogen dioxide, 4.3 pphm; sulfur dioxide, 3.6 pphm, dust, 0.9 mg/cu m; carbon monoxide, 3.1 ppm; hydrocarbons, 0.9 ppm; and nitric oxide, 5.7 pphm. Average oxidant concentrations (pphm) were: spring, 2.7; summer, 2.6; and winter 3.7.

50015 **APTIC NO. 71945**

Hammerle, R. H. and W. R. Pierson

SOURCES AND ELEMENTAL COMPOSITION OF THE AEROSOL IN PASADENA, CALIFORNIA--A STUDY BY ENERGY-DISPERSIVE X-RAY FLUORESCENCE. *Preprint, Ford Motor Co., Dearborn, Mich., Scientific Research Staff, 75p., Oct. 24, 1974. 54 refs.*

The sources and elemental composition of the aerosol in Pasadena, Calif. was analyzed by an automatic X-ray fluorescence spectrometer. The instrument include a silicon (lithium) semiconductor detector, molybdenum secondary-target X-ray tube, and mini-computer for analysis and system control. Nine elements were consistently measured with reasonable accuracy: calcium, titantium, vanadium, manganese, iron, nickel, zinc, bromine, and lead. Gasoline engine exhaust from the immediate vicinity is the source of the Br and Pb; soil from the basin is the main source of the Ti, Mn, and Fe; much of the Ca is from cement dust contamination of the soil, and the rest of the Ca is indigenous to the soil. Other sources were not identified. The soil contributed 8.35 micrograms/cu m and the primary exhaust particulate from gasoline engines contributed 5.35 micrograms/cu m, on the average, to the aerosol mass at the Pasadena site during the 29-day sampling period. (Author abstract modified)

50016 **APTIC NO. 72191**

Hirono, T., K. Asakuno, T. Oodaira, K. Arashidani, and H. Matsushita

POLLUTION OF TUNNELS, ROADS, AND CAR INTERIORS BY 3,4- BENZOPYRENE AND OTHER COMPOUNDS. *(3,4-Benzopiren nado ni yoru tonneru, doro oyobi jidoshanai no osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):601, Nov. 1974. (Presented at the Natoanl Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 448.)*

Concentrations of polynuclear aromatic hydrocarbons (PAH), carbon monoxide, and heavy metals were measured at an intersection, in a tunnel, and in the interior of a traveling car. At the intersection, and in the tunnel, PAH (carcinogen) particles existed in sizes less than 8 microns, about 95% of the time, i.e., as respirable dust. Amounts of PAH per unit amount of air in the tunnel were 2.5-5 times higher than those in the intersection. Within a traveling car, in terms of distance traveled per unit time, road conditions and size of open windows (1 cm vs. 10 cm) influenced PAH concentrations. Also, as CO concentration increased, PAH concentrations, including BaP (benzo(a)pyrene) and B(ghi)P (benzo(ghi)perylene), increased.

50017 **APTIC NO. 72172**

Imai, Y., M. Ito, K. Tsuchida, S. Ito, H. Yoshinari, and M. Kondo

VARIATION OF POLLUTANTS IN PHOTOCHEMICAL SMOG (II). *(Kokagaku sumoggu hassei doki ni okeru osenshitsu no doko (II)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 9(2):583, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 432.)*

Ozone and oxidant concentrations in photochemical smog were measured at three locations (bayside (west), oceanside (east), and inland (northeast of bayside)) in Chiba Prefecture, Japan, from June to July 1973, during the same time periods. At the bayside location, oxidant concentrations were measured at heights of 4 m and 30 m. Data from oceanside and inland measurement stations more or less agreed in tendencies. There was not much difference between ozone and oxidant concentrations; i.e., the oxidant pollutant was ozone for all practical purposes. At the bayside location, oxidant concentration was much higher than ozone concentration, even after correction for nitrogen oxides. Oxidant concentration at a height of 4 m was about half the oxidant concentration at 30 m, whether pollutant concentrations for the day were normal or high. It is conceivable that a 4 m, ozone is decomposed by carbon monoxide emission from automobile exhausts.

50018 **APTIC NO. 71804**

Ishii, Akio

INVESTIGATIONS ON AIR POLLUTION IN A HIGH-RISE BUSINESS DISTRICT (NO. 2) POLLUTION CONDITIONS ON THE STREET. *(Ofisu-biru gai no taiki osen ni kansuru jissoku chosa. (Sono 2) Ofisu gai no osen jokyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):514, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 361.)*

Hourly average sulfur dioxide concentrations from December 1972 to February 1973 were plotted for three buildings (A, B, C), located in a high-rise business district in Tokyo. For building A, SO2 concentrations were highest (about 18 pphm) from 8-9 am on working days, decreasing thereafter. On holidays, there was not much variation in SO2 concentration (3 pphm) during the 24 hr. Daily (working-day) variations in SO2 concentration from December to January for buildings A, B, C followed similar patterns, but A showed a very marked concentration peak between 7-9 am, and a very marked decrease between 5-7 pm, denoting its location amidst office buildings. From night to early morning, SO2 concentrations were highest for C (5 pphm), next highest for B (slightly lower), and lowest for A (3 pphm). Proximity to nighttime activities (newspaper plant, hotel, restaurants) of buildings B and C probably account for this variation.

50019 **APTIC NO. 71630**

Jordan, Erik

CITY PORTRAIT (VIII): WETZLAR. AN IDYL SUFFERS FROM DUST. *(Staedteportraet(VIII): Wetzlar Eine Idylle* *leidet unter Staub). Text in German. Umwelt (Duesseldorf), 4(6):20s21, 1974.*

Wetzlar is a tourist attraction as well as an industrial city. The city has the highest dustfall and dust concentration of all of Hesse. Since 1970 a measuring grid with twelve squares each covering an area of 1 sq km has existed in which the dust fall is measured with Bergerhoff units. This program has been supplemented by respirable concentration measurements since mid-1972. The results revealed that the long-term dust limit concentration for non-industrial areas of 0.42 g/sq m day is exceeded in five squares and the short-term value of 0.65 g/sq m day is exceeded in six squares. Even the limit values for industrial areas (0.85 and 1.3 g/sq m) are exceeded in four squares. Particularly disturbing is the fact that the long-term dust concentration in the north of Wetzlar rose by more than 30% and the short-term concentrations by more than 40%.

50020 **APTIC NO. 71655**

Kimura, Kikuji

DETERMINATION OF AIRBORNE ASBESTOS FIBERS ON THE ROAD. *(Rojo no asubesuto funjin). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):235, Nov. 197- (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 94.)*

Dust was collected on membrane filters, and microscopically examined for presence of asbestos. Asbestos is assumed present when fiber length is over 5 micron and the ratio of length to width is greater than 3:1. Roads and highways yielded 2.8-17.0 fibers/l, while building interiors, where asbestos was used in construction, yielded 0.5-0.7 fibers/l. Asbestos fibers in the samples can be identified by utilizing the index of refraction of asbestos (1.5). Road samples from the center of the city contained 32.5-65.5% asbestos.

50021 **APTIC NO. 71710**

Kodama, Y.

ATMOSPHERIC DISTRIBUTION OF POLYNUCLEAR AROMATIC COMPOUNDS. *(Taikichu no bunpu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):134-135, Nov. 1974.*

Benzo(a)pyrene, B(a)P, in sedimental dust and airborne dust is analyzed at several cities in Kyushu. The B(a)P level can be used as an air pollution index for areas having similar meteorological conditions. The B(a)P level in sedimental dust was higher in industrial cities than in business cities, and the average B(a)P found during 1965 through 1970 was 52.3 and 11.2 micrograms/sq m mo respectively. The seasonal variation of B(a)P in sedimental dust was not clear; however, levels more than 100 micrograms/sq m mo are often observe/ during the fail to winter periods. The B(a)P in airborne dust has been very low since 1970, and industrial areas showed levels below 5 micrograms/1000 cu m.

50022 **APTIC NO. 72058**

Koyama, T., S. Miyazaki, and S. Sano

PARTICLE SIZE DISTRIBUTION OF ATMOSPHERIC SUSPENDED PARTICULATE IN KANAGAWA PREFECTURE, PART II. *(Kanagawa-kenka ni okeu taiki chu no fuyu funjin no ryukei bunpu, dai 2-ho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):529, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 377.)*

By using an Andersen air sampler, airborne particulates were collected by two locations in Kanagawa Prefecture, and analyzed for particle concentration and size distribution of iron, lead, and total dust. X-ray fluorescence was used for Pb and Fe analyses. There was a seasonal difference in the size distribution of total dust. At one of the locations the size varied only during the summer and the highest MMD value observed was in late August (4.2 micron), while at the other location size varied only during the winter. At the former location, which is nearby a large industrial area, the MMD value grew when the wind blew from the industrial area, and this was considered to be due to soot generated in the area. The average MMD values for Fe and Pb were 4-5 and 0.03-0.5 micron, respectively. The Pb particle size distribution was nearly constant throughout the investigation period (June through January). The Pb and Fe concentrations were nearly constant at 0.1 and 1 microgram/cu m, respectively, for one location, but varied between 0.2-0.5 and 2-6 micrograms/cu m, respectively, for the other location.

50023 **APTIC NO. 72205**

Kretzschmar, J. G. and L. De Ridder

STUDY OF AIR POLLUTION BY SULFUR DIOXIDE ON THE LEFT BANK OF THE SCHELDE RIVER IN ANTWERP. *(Onderzoek naar de SO2- luchtverontreiniging op de linker Schelde-oever te Antwerpen). Text in Dutch. Ingeniursblad, 43(23):705-717, 1974. 9 refs.*

The sulfur dioxide concentrations were measured on the left bank of the Schelde river in Antwerp by means of mobile test vans, using the pararosaniline method. The highly industrialized area was subdivided into squares of 2 by 2 km, and four sampling sites were assigned within each square. The arithmetic means of the SO2 concentrations ranged from 52 to 138 micrograms/cu m in the different squares, while the 95-percentile limits ranged from 168 to 523 micrograms/cu m. A relationship was established between the SO2 concentrations and certain wind directions.

50024 **APTIC NO. 71610**

Kurokawa, M., T. Aso, H. Mimura, Y. Suyama, K. Aihara, and M. Kaneko

DETERMINATION OF ATMOSPHERIC ANTIMONY. *(Taikichu no anchimon no teiryoho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):229, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 88.)*

Procedures similar to those described in a previous paper for atmospheric arsenic determination were used for atmospheric antimony determination. Stibine (SbH3) was generated in a magnesium-packed column by reduction of antimony chloride (SbCl3), and absorbed in 5% potassium bromide-bromine solution. Atomic absorption photometry was used for simple, accurate analysis of antimony. For each sample solution, analysis was completed in a few minutes. Interference was negligible from other ions (iron(+3), copper(+2), nickel(+2), calcium(+2), manganese (+2), lead(+2), arsenic)+3), chromium(+6)) at test concentrations (25-200 times the antimony concentration). High-volume air sampler was used to collect air samples in Kanagawa Prefecture, Japan, for determination of atmospheric antimony. Antimony concentrations ranged from less than 6 to 60 ng/cu m. Antimony concentration of 6 ng/cu m is the lower limit of analysis.

50025 **APTIC NO. 71746**

Kurokawa, M., T. Aso, H. Mimura, K. Aihara, and M. Kaneko

DETERMINATION OF ARSENIC IN ATMOSPHERE. *(Taikichu no hiso no teiryoho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):228, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 87.)*

Atmospheric arsenic was quantitatively determined by conversion to arsine (AsH3) in a zinc-packed column and its subsequent analysis with the atomic absorption photometer. Interference from other ions (iron(+3), manganese(+2), zinc(+2), chromium(+6), copper(+2), antimony (+3)) was negligible, even with the test concentrations under consideration (200-50,000 times that of arsenic). Iodine solution (KI-I2 mixture) was found suitable for absorbing arsine. Analysis can be completed in a few minutes for each sample. Air samples were collected with a high-volume air sampler. Atmospheric arsenic concentrations were measured for various cities in Kanagawa Prefecture. Japan, and ranged from 2-33 ng/cu m.

50026 **APTIC NO. 71887**

Manes, A., M. Rindsberger, D. Guetta, and A. Teitelman

LONG TERM TRENDS IN VISIBILITY AT THE BEN GURION (LOD) AIRPORT AREA. *Israel J. Earth Sci., 23(1-2):1-7, 1974. 12 refs.*

An extended record of visibility data (1940-1971) from the Ben Gurion (Lod) Airport Station (about 10 km southeast of Tel Aviv) was analyzed to determine whether there existed a trend of decreasing visibility due to air pollution build-up over the Tel Aviv area. A steadily decreasing visibility trend was observed, starting from about 1956. The most pronounced decline in visibility appeared during the last five years (1967-1971). Since the Ben Gurion Airport is located downwind of the Tel Aviv metropolitan area, the trend of decreasing visibility may reflect the process of air quality deterioration over the Tel Aviv metropolitan area. Visibilities may reach values requiring instrument approach if the present trend continues. (Author abstract modified)

50027 **APTIC NO. 72232**

Matsushita, H., K. Arashidani, H. Hayashi, M. Nagata, M. Ichihashi, and H. Sato

STATUS OF AIR POLLUTION IN KAWASAKI CITY BY BENZO(A)PYRENE AND OTHER MATTER. *(Benzo(a)piren nado ni yoru Kawasaki-shi no taiki osen jokyo)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):603, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 450.)*

Airborne dust samples were taken at seven monitoring stations in Kawasaki City from December 1973 to March 1974, and analyses for benzo(a)pyrene (Bap) and heavy metals were conducted. The range of BaP concentrations was 1.50-20.0 micrograms/1000 cu m air, or 13.0-87 micrograms/g dust. During the same time period, natural background BaP concentrations were 0.07 micrograms/1000 cu m air, or 2.5 micrograms/g dust. There was high correlation between the amount of BaP present and amounts of lead, cadmium, vanadium, and airborne dust. The relationship of pollutants to the pollution source may be surmised from such data. There is a tendency for BaP correlation coefficients with these four materials to increase as measurements are shifted from high pollution to low pollution regions.

50028 **APTIC NO. 71624**

Minegishi, A., Y. Shinozaki, H. Morishima, and N. Ota

ELECTRON SPIN RESONANCE OF ATMOSPHERIC DUST AT TAISHIDO JUNIOR HIGH SCHOOL, TOKYO. *(Setagaya-kuritsu Taishido Chugaku ni okeru kukijin no denshi supin kyomei (ESR) supekutoru ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):239, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 99.)*

Dust samples were collected with a high-volume air sampler in the Tokyo schoolyard from June to August 1973. Samples were collected during the time photochemical smog was most likely to occur (between 10:00 am and 3:00 pm). On both normal days and abnormal (photochemical smog) days, the electron spin resonance (ESR) spectra of atmospheric dust has a fairly definite structure. It is a composite single line with the center at g, 2.2 and the half-value width at 500 gauss. The correlation between ESR spectra and sulfur oxides concentrations was good on normal days. On abnormal days, ESR intensities were 1.4-2 times greater than the values expected from the SOx concentrations. Formation of aerosol particles (over 10 microns in size), or change in valence state of the metals by oxidation are possible explanations. On abnormal days, oxidant concentrations were above 0.8 pphm, nitrogen dioxide (nitric oxide + NO2) was above 0.6, and ESR intensities were above 0.000^{5}.

50029 **APTIC NO. 71775**

Mitome, Shoichi and Koichiro Hirano

CHARACTERISTICS OF AIR POLLUTION BY SULFUR OXIDES IN KANAGAWA PREFECTURE COASTAL INDUSTRIAL REGION. *(Kanagawa-ken rinkai kogyo chiku ni okeru io snakabutsu ni yoru taiki osen seijo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):505, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 352.)*

The flow of atmospheric pollutants (sulfur oxides) was traced by statistical methods from Negishi Bay to Yokosuka, Japan during January 1974. A pollutant belt stretched from Yokosuka to Negishi, over Tokyo Bay. Pollutants follow the hills near Yokosuka to various regions nearby. Regional pollution areas in Yokosuka are formed from individual high pollution sources and urban pollution sources. Pollution sources around Tokyo Bay also contribute to pollution in this area. Topographical as well as meteorological influences on air pollution are present in this area. Maps of pollution distribution are included.

50030 **APTIC NO. 72226**

Mitsutani, K. and M. Kondo

ON THE INFLUENCE OF AIR POLLUTANTS ON INDOOR ATMOSPHERE (REPORT NO. 2). *(Taiki osen busshitsu no shitsunai kankyo ni oyobosu eikyo ni tsuite (Dai-2-ho)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):588, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 437.)*

Pollutant measurements were taken inside a building with air conditioning. Outdoor and indoor pollutant concentrations were compared for dust, lead, cadmium, copper, iron, manganese, nickel, cobalt, aldehydes, nitrogen dioxide, and sulfur dioxide. More than 90% of atmospheric SO2 was filtered out, merely by use of the usual dust filter. However, indoor NO2 and aldehyde concentrations were higher than their outdoor concentrations, because they cannot be filtered out easily, and because of indoor tobacco smoke and building materials. Removal of NO2 was 23% using glass fiber filter, and 46% using activated carbon. In general, interior dust and heavy metal concentrations were half of those found outdoors, but carbon monoxide concentrations were higher indoors.

50031 **APTIC NO. 71659**

Miyoshi, T., N. Jinbo, Y. Yanagisawa, M. Ito, F. Shimomura

SIMPLE MEASUREMENT OF HEAVY METALS IN AIR WITH ALKALI FILTER PAPER. *(Arukari roshi-ho ni yoru taikichu jukinzoku no kani sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):234, Nov. 1974. (Presented at the National Air Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 93.)*

Airborne dust particles, less than 0.5 micron in diameter, were captured on filter paper and treated with 10% solution of sodium carbonate. Presence of heavy metals was determined by wet ashing (preferred method) or by extraction with nitric acid (1:1) and 30% hydrogen peroxide. Zinc concentrations, determined from filter paper collections, showed the same tendencies as zinc concentrations determined from analysis of mulberry leaves in the neighborhood of a zinc processing plant.

50032 **APTIC NO. 71660**

Nakagawa, Y. and T. Takada

DETERMINATION OF SELENIUM COMPOUNDS IN SUSPENDED PARTICULATES BY DC POLAROG-

RAPHY. (Chokuryu poraroguraƒuho ni yoru fuyu ryushijo busshitsu chu sereniumu kagobutsu no teiryo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):231, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 90.)

The concentration of selenium compounds in airborne particulates was determined by DC polarography. Ions which interfere with the analysis include zinc (+2), manganese (+2) (because of half-wave potentials), and iron (+3), aluminum (+3) (because of precipitation problems). Consequently, the samples were run through an ion exchange column (Dowex 50W-2X) before polarography was attempted. Results obtained from polarography agreed well with results obtained from colorimetry and atomic absorption photometry. Selenium concentrations in the environment ranged from 0.007-0.038 micrograms/cu m. Concentrations at the pollution source ranged from 0.3-8.8 mg/N cu m.

50033 **APTIC NO. 71889**

Navrot, J. and A. J. Amiel

METALLIC CONTAMINANTS IN DUST STORM DEPOSITS IN THE REHOVOT AREA. *Israel J. Earth Sci., 23(1-2):9-11, 1974. 12 refs.*

Dust samples collected in the industrialized Rehovot area of Israel during the period 1966-1973 showed increased concentrations of copper, zinc, and possibly nickel. Maximum annual concentrations of the three metals were 137, 175, and 44 ppm. The increases were attributed to air pollution resulting from industrialization in the Rehovot and Ashdod areas as well as the increased use of copper-containing fungicides in surrounding agricultural areas. Dust samples collected from three widely separated areas (Rehovot, Tel Aviv, and Zefat) during 1973 showed very significant differences in copper, zinc, and lead contents. Higher lead concentrations (102 ppm) in Tel Aviv dusts as compared to those for the recreational area of Zefat (25 ppm) and industrialized Rehovot (10-21 ppm) were attributed to a higher density in Tel Aviv.

50034 **APTIC NO. 71744**

Oomichi, S. and H. Uno

CHEMICAL CONSTITUENTS OF ATMOSPHERIC AIRBORNE DUST. *(Taikichu fuyu baijin no kagakuteki sosei to keitai). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):237, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 96.)*

Twenty dust samples were collected during the same time period (Nov.-Dec. 1973) on each of four different machines: cyclone-type (cut particles greater than 10 microns) high-volume air sampler; multi-stage-type low-volume air sampler; high-volume air sampler; and digital dust counter. There was good correlation among the results from the cyclone-type high-volume air sampler, multi-stage-type low-volume air sampler, and digital dust counter. Metal components of dust samples were determined for the cyclone-type high-volume air sampler and the high-volume air sampler. For airborne particle sizes of less than 10 microns, metals present included copper, zinc, chromium, cadmium, lead, nickel, vanadium, iron, and manganese. Iron and manganese were present in the lowest concentrations.

50035 **APTIC NO. 71773**

Oya, F., S. Ochiai, T. Mukaida, O. Asai, H. Yanaka, and K. Aihara

ON ATMOSPHERIC POLLUTION BY SULFUR OXIDES IN THE KEI-HIN (TOKYO-YOKOHAMA) INDUSTRIAL REGION DURING NEW YEAR S HOLIDAYS. *(Kei-Hin kogyo chitai no nenmatsu nenshi ni okeru io sankabutsu no taiki osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution 9(2):512, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 359.)*

Sulfur dioxide emissions and concentrations in the Yokohama-Kawasaki Industrial Area during yearly two-week periods (Dec. 25-Jan. 5), beginning with December 1969 through January 1973, were compared. Sulfur dioxide concentrations have decreased yearly. In 1973, SO2 emissions were about 2800 N cu m/hr before the holidays (before December 25), and about 1600 N cu m/hr by New Year s. Reduction of 70-80% from 1969 values had been effected, mainly because of stringent regulations. However, normal (December 25) heavy oil consumption decreased by only 4.8% from 1971 to 1973, and did not show the effects of the oil crisis.

50036 **APTIC NO. 71986**

Reay, J. S. S.

MONITORING THE ATMOSPHERE. *Loughborough Univ. of Technology (England), Leverhulme Project. Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-15. (Jan. 7-8.)*

Air pollution monitoring activities in Great Britain are described. Smoke and sulfur dioxide are monitored at 1200 sites, predominantly in urban areas. Annual smoke emissions appear to be decreasing, with a reduction of from 2.5 million tons to 1.0 million tons being observed over the period of 1950-1970. Sulfur dioxide emissions over the same period show an increase from 4.5-5.5 million tons/yr, though these emissions are not growing as fast as energy consumption. The main growth in SO2 emissions is accounted for by oil refineries and power generation. Sulfur dioxide emissions from transport systems and domestic heating are decreasing, while those from general industry appear to be remaining constant. Ambient air pollution from vehicular emissions is also being monitored; carbon monoxide, total hydrocarbons, lead, and smoke are being measured in five cities. Nitric oxide, nitrogen dioxide, ozone, and gaseous sulfur compounds are also being measured at two sites in London. Tighter specifications covering carbon monoxide, hydrocarbons, and smoke are already in effect for diesel and gasoline engines as a result of such monitoring.

50037 **APTIC NO. 71925**

Rossano, A. T. and E. J. Lillis

THE IMPACT OF MOTOR VEHICLE TRAFFIC ON CONCENTRATIONS OF LEAD AND CADMIUM IN HOUSEHOLDS AND DUSTFALL ADJACENT TO MAJOR ROADWAYS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., Pacific Northwest International Section, 11p., 1974. 27 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 18, 1974, Paper 74-AP-33.)*

Dust samples from 36 sites adjacent to roadways were collected from household vacuum cleaners and outside areas near the roadways and analyzed for lead and cadmium to determine the impact of motor vehicle traffic on contamination by the two metals. Concentrations of dustfall lead along roadways ranged from 800 ppm to 5400 ppm, with a mean value of 2800 ppm. A statistically significant relationship existed between traffic volume and dust concentrations of lead along roadways. Lead concentrations in road dust decreased systematically as a function of increasing distance from major arterials. The average house-dust lead concentration was 1500 ppm, about four times that measured in homes located substantially away from all major roadways. Lead concentration in house dust decreased with increasing distance from the roadway. Cadmium levels in road dust ranged from 11-107 ppm with an average of 31 ppm. Household cadmium levels ranged from 6-170 ppm. The average was 28 ppm as compared to a background concentration at a suburban location of 40 ppm. There was no strong correlation between cadmium in household dust and dustfall samples and sampling distance from the roadway.

50038 **APTIC NO. 71734**

Sasaki, T. and N. Yamashita

EFFECTS OF ENVIRONMENTAL POLLUTION ON INHABITANTS IN HIGASHIYAMA DISTRICT, KYOTO CITY. PART I. RESULTS OF ENVIRONMENTAL INVESTIGATION. *(Kyoto shinai Higashiyama chiku ni okeru kankyo osen no jumin ni oyobosu eikyo (sono 1). Kankyo chosa o chushin to shite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. Public Health), 21(10)Suppl.:437, Oct. 1974. (Presented at the Japanese Society of Public Health, Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974.)*

An environmental survey of the district along Higashiyama avenue in which the increase of motor traffic was said to be the cause of environmental aggravation was carried out from June to Sept. 1973 and compared to a control area. The results concerning air pollution were as follows: the concentration of lead in air was 0.59-1.19 micrograms/cu m as compared to 0.20 micrograms/cu m in the control area, both being less than the standard for Kyoto Prefecture; the concentration of CO was maximum 12.0 ppm (1 hr), minimum 5.1 ppm as compared to 5.7 and 2.9 ppm in the control area, and 8.0 ppm on the 8 hr average as compared to 3.6 ppm. Complaints of withering of plants was 50% in Higashiyama and 24% in control areas.

50039 **APTIC NO. 71633**

Schmidt, Manfred

CHARACTERISTIC CONCENTRATION OF CONDENSATION NUCLEI AT TWO STATIONS IN SOUTHERN GERMANY. *(Verlauf der Kondensationskernkonzentration an zwei sueddeutschen Stationen). Text in German. Meteorol. Rdsch., 27(5):151-153, 1974. 9 refs.*

At the two stations Weissenau/Ravensburg (altitude 445 m above sea level) and Hoechstens near Lake Constance (altitude 830 m above sea level) in the Federal Republic of Germany the concentrations of Aitken nuclei and cloud nuclei were measured and recorded over the period 1964 to 1971. Of the numerous individual results obtained, two particularly remarkable results are discussed briefly. The concentration of Aitken nuclei increased over the 7-year period by 4% annually at the station Weissenau and by 10% annually at the station Hoechsten. As likely cause for the gradual increase of the concentration of Aitken nuclei the overall increase of air pollution is cited. The number of cloud condensation nuclei was dependent on the concentration of Aitken nuclei.

50040 **APTIC NO. 72225**

Segawa, Akira

ON THE DETECTION OF CYANIDE IN PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu to taikichu no shian). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):585, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 435.)*

Atmospheric cyanide concentrations were determined colorimetrically in August 1973, in Osaka Prefecture, Japan. Atmospheric cyanide was present only on those days when photochemical smog alerts occurred and maximum oxidant concentrations were above 0.12 ppm. The maximum hourly cyanide concentration was 0.01 ppm when oxidant concentration was at a maximum of 0.15 ppm. Since no serious illness complaints were registered on days when atmospheric cyanide was present in these concentrations, it is still problematical as to what extent cyanide effects physical disorders.

50041 **APTIC NO. 71595**

Sugino, Mamoru and Kaoru Ashida

AIR POLLUTION AND URBAN VEGETATION (II). (2) THE MOVEMENT OF POLLENS SCATTERED BY GOLDENROD IN THE AIR. *(Taiki osen to toshi shokusei (2). Seitaka awadachiso gunraku yori hosbutsu sareta kuchu kafun no dotai). Text in Japanese. Kinki Daigaku Kogai Kenkyusho Kenkyu Hokoku (Kinki Univ. Pollut. Res. Inst. Rep.), no. 2:133-140, Oct. 1974.*

Measurements of pollens from Goldenrod were made at six locations, three at a highly polluted area and three at a less polluted mountain area. A petri dish (75 mm) containing 10% formalin solution was placed 90 cm above the ground for the collection of pollens and the solution was refilled when dry. For collecting pollens in the less polluted mountain area, a 1% agar plate containing 0.025% methylene blue was used in addition to the 10% formalin solution to slow down evaporation. Pollens collected in the Petri dish were counted with the aid of a microsope. In the polluted area, the pollen concentration reached its peak at the end of October to the beginning of November, and the concentrations in the mountain area were 1/5 to 1/10 those in the polluted area.

50042 **APTIC NO. 71663**

Sugiura, Shigeru and Takehiko Ogata

VISIBILITY TREND FROM 1950 TO 1972. *(Tokyo ni okeru saikin no shido no keinen henka). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):531, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 379.)*

The transition of visibility in Tokyo since 1950 was considered using the data available at the meteorological observatory of Tokyo. The average visibility in 1950 was 9 km and it decreased util 1960, at which time the lowest visibility of 20 years was observed, 7 km. However, the visibility has improved every year since then, and the average visibility in 1970 reached 11 km. The transition of hourly visibility in 1960 and 1970 is compared. The general trend of hourly visibility was the same in both years, and the lowest visiblity occurred at 9 am. Seasonal visibility in 1960 and 1970 was also compared. The 1970 value was much higher in winter than summer, while the visibility in winter was slighty poorer than that in summer for 1960. The improvement of visibility in recent years is also evident from the frequency of occurrence of certain visiblities. During 1956 and 1960, the frequency was 50% for visibility less than 5 km and 1% for visibility more than 25 km, but these values were 32% and 10% from 1966 through 1970.

50043 **APTIC NO. 71644**

Suzuki, M., Y. Endo, and E. Yoneyama

MEASUREMENT OF NITRATE ION IN AIRBORNE PARTICULATES BY ION-ACTIVE ELECTRODE. *(Ion denkyokuho ni yoru fuyu funjinchu no shosan ion no sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):242, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 102.)*

The amount of nitrate ions present in airborne dust, collected by high-volume air sampler, was determined by using a nitrate ion-sensitive electrode. The linear range for electrode potential observations lay between nitrate concentrations of 1 microgram/ml and 1000 micrograms/ml. Usual concentrations of nitrate ions in urban airborne particulate range from 1-40 micrograms/cu m, so at least 2 cu m of air sample should be collected. Interference from other negative ions at the nitrate ion electrode is possible. However, interference from chloride and sulfate ions, in concentrations five times that of the nitrate ion, was less than 1 mV. In actual air samples, the predominant water-soluble negative ions are present in the ratio of nitrate (1):chloride (0.3-2.5):sulfate (0.4-2.5).

50044 **APTIC NO. 71809**

Tateno, Kimiko, Toshie Nakazono, and Azuma Kido

DISTRIBUTION OF ATMOSPHERIC SULFUR OXIDES OVER KITAKYUSHU CITY. *(Kitakyushu-shi ni okeru io sankabutsu nodo no bunpu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution, 9(2):502,* *Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 346.)*

Concentration distribution of atmospheric sulfur oxides in Kitakyushu City, Japan and its environs was determined by nephelometry in September 1973. sSixty-four sampling locations were utilized. Samples were collected by the lead dioxide method. Sulfur oxide concentrations were higher at the top of mountains than at the foot or the middle of the mountains. Georgraphic plots of sulfur oxide concentrations are included.

50045 **APTIC NO. 72229**

Tsubura, K., T. Gatayama, M. Okamoto, and Y. Yoshida

ON THE CORRELATION BETWEEN INDOOR AND OUTDOOR ATMOSPHERIC POLLUTANT CONCENTRATIONS. *(Shitsunai to shitsugai ni okeru taiki osenbutsu nodo no sokansei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):590, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 439.)*

Indoor and outdoor pollutant concentrations with respect to a room in Kawasaki, Japan, were measured continuously during seven-day periods in May and August. Pollutants under observation included nitric oxide, nitrogen dioxide, nitrogen oxides, sulfur dioxide, TS (total sulfur oxides), THC (total hydrocarbons), methane, carbon monoxide, and ozone. Windows of the room were open some of the time, and air conditioning equipment operated only during the hours of 8 am-5 pm. Indoor concentration changes in NOx and O3 followed outdoor concentration changes, but THC concentration behavior was erratic; concentrations actually increased at night. Air conditioning equipment was effective in removal of sulfur compounds, but ineffective toward other pollutants.

50046 **APTIC NO. 71776**

Uehara, Akira

CHANGES IN CONCENTRATION OF SULFUR OXIDES IN YOKOHAMA CITY. *(Yokohama-shi ni okeru io sankabutsu nodo no suii). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):506, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 353.)*

Concentration changes for sulfur oxides were followed from 1959 to 1973 in Yokohama City at 32 observation stations. The lead dioxide method was used to determine SOx concentrations, and was found to be a suitable technique for long-term monitoring of changes. Yokohama City was divided into seven monitoring regions: coastal industrial region (2 areas); inland region (4 areas); and high building concentration region (1 area). While SOx concentrations have decreased, they have shown a tendency to level off in recent years at values which are still undersirably high (e.g., 0.60 mg SO3/day/100 sq cm, in the building region). More stringent SOx emission standards are desirable.

50047 **APTIC NO. 69182**

Waibel, Martin and Hans-Urs Wanner

MEASUREMENTS OF PARTICULATE MATTER AND 3,4-BENZPYRENE IN ZURICH. *(Schwebestaubmessungen und Bestimmungen des 3,4-Benzpyrengehaltes in Zuerich). Text in German. Zentralbl. Bakteriol. Hyg. Infektionskr. Abt. Orig., 159(2):169-177, 1974. 8 refs.*

Measurements of particulate matter and 3,4 benzpyrene were carried out at six measuring points in and around Zurich in 1971/72. The measuring points differed according to their immediate surroundings; they were subdivided into industrial zone, heavy traffic spots, residential area, and recreation ground. The correlations were calculated to clarify the connections between emissions and meteorological influences including temperature, inversions, humidity, air pressure, wind strength, visibility, and sunlight. The annual average values for the aerosol concentration were highest on Paradeplatz with 160 and Albisriederplatz qith 181 micrograms/cu m where traffic is very heavy. The industrial center Escher-Wyss with 128 micrograms/cu m residential area of the old part of the city with 125 micrograms/cu m assumed a middle position. The modern residential section of Triemli measured the lowest concentration, 100 micrograms/cu m. The annual average concentrations for BaP were 5.3 ng/cu m for the industrial center, 5.5 and 7/7 ng/cu m for Paradeplatz and Albisriederplatz and 4.1 ng/cu m for Triemli. A high BaP concentration of 6.4 ng/cu m was measured in the old residential section. A correlation between the aerosol concentration of the air and the mortality from stomach cancer was found. Particularly pronounced was the influence of air pollution on mortality due to respiratory diseases. It tripled from the zone with lowest aerosol concentration (less than 80 micrograms/cu m) to the zone with highest air pollution (more than 135 micrograms/cu m). Compared to West German and U. S. cities the aerosol and BaP concentrations measured in Zurich were rather high.

50048 **APTIC NO. 71613**

Winkler, Peter

THE RELATIVE COMPOSITION OF THE ATMOSPHERIC AEROSOL IN TERMS OF SUBSTANCE GROUPS. *(Die relative Zusammensetzung des atmosphaerischen Aerosols in Stoffgruppen). Text in German. Meteorol. Rdsch., 27(5):129-136, 1974. 40 refs.*

Measurements of continental atmospheric aerosols were taken in Mainz (30 m above ground, 30 samples, May 1969), in Quickborn 30 km north of Hamburg (80 samples, July-September 1969) and in Deuselbach in a rural setting (12 samples, August 1969). For the analyses several aerosol samples in the range of 50 to 100 micrograms collected simultaneously with jet impactors on aluminum foil were used. The aluminum foil was not coated with an adhering agent. The samples were taken only at relative humidities of more than 75%. Each sample was dipped in a series of different solvents and the weight loss was determined afterwards. The solvent sequence was different for every sample. Approximately 60% of the total mass consists of water soluble material, 25-30% of organic matter, and 25% of the mass is volatile at temperatures up to 150 C. Both of the latter fractions contain high percentages of water soluble substances also. Approximately 35% of the total mass is insoluble, consisting mainly of minerals. Measurements in polluted and less polluted areas revealed that the insoluble fraction was smaller in rural areas, while the relative composition of the soluble fraction did not vary much.

50049 **APTIC NO. 72233**

Yoshinari, H., M. Ito, K. Tsuchida, S. Ito, N. Imai, and M. Kondo

REGIONAL DISTRIBUTION OF OXIDANT CONCENTRATION IN CHIBA PREFECTURE. *(Chiba-ken nai no okishidanto nodo no bunpu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):582, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 431.)*

Atmospheric oxidant concentrations were measured at 24 monitoring stations in Chiba Prefecture, Japan, from June to August 1973. Maximum oxidant concentrations ranged near 0.20 ppm, with concentrations higher near the coast, and lower inland. However, measurements by portable monitoring vehicles at Tateyama and Togane, previously considered non-polluted, showed oxidant concentrations of over 0.07 ppm for more than 80 hours. It is quite conceivable that higher pollutant concentrations are possible in the future of these regions.

50050 **APTIC NO. 69242**

Tokyo Metropolitan Government (Japan), Shinagawa District

REPORT ON AN INVESTIGATION OF THE ENVIRONMENT (1973). *(Kankyo chosa bokokusho). Text in Japanese. 53p., March 1974.*

The state of air pollution by automotive exhaust gases was investigated in the Shinagawa district of Tokyo. A total of 21 locations, a point per 1 sq km, were assigned as measuring locations, and the investigation was conducted between Oct. 1 and Nov. 7, 1973. Lead was analyzed from 24-hour samples of air in mylar bags by atmoic absorption spectrophotometry; carbon monoxide was analyzed from the mylar bag 8-hour sampling at three points of each intersection, and non-dispersive infrared analyzer was applied. The traffic was counted for 10 min at noon by car types and by direction, and the figures were multiplied by six to obtain hourly rates. Lead pollution was about the same level as in the two investigations in the past two years with an average of 1.11 micrograms/cu m. A general plateau state seems to have been reached. The number of locations that exceeded 10 ppm/hr of CO by 8-hour measurement were four in 1971, six in 1972, and one in this year. The reason for the high concentration of the one location was the multiple reaction of the weather, the low land topography of the intersection, and the poor road conditions that caused slowing down of the traffic. With regard to the background areas and highways, 50 m away from intersections showed lesser pollution. The average at intersections was 7.2 ppm, along the road away from the intersection, 5.7, and in the background areas, 4.3 ppm. The traffic averages for 1971, 1972, and 1973 were 2882, 2814, and 2876 respectively; the minimums were 326, 336, and 324 for the three years, and the maximums were 6063, 5886, and 5735.

50051 **APTIC NO. 72097**

Osaka Municipal Government (Japan)

POLLUTION - PRESENT CONDITIONS AND COUNTERMEASURES. *(Kogai no genkyo to taisaku). Text in Japanese. 51p., April 1974.*

The sulfur dioxide concentrations in the city are being reduced steadily since the introduction of the Clean Air Plan. The average concentration was reduced from 0.063 ppm in 1970 to 0.054 ppm, in 1971 and to 0.039 ppm in 1972. Airborne particulates concentrations have also been reduced steadily from 1967 to 1972, except for the Nishinari ward where the average concentration in 1972 was 159 micrograms/cu m. Air pollution by automobile exhausts have increased significantly in the past few years. The NOx emission from moving sources exceeded 18,000 tons/yr in 1972, or more than 34% of the total emission. A new Clean Air Plan for 1973 was introduced by revising the Clean Air Plan for 1971. The environmental standard for SO2 was revised and new standards for nitrogen dioxide and oxidants were instituted. The new plan was aimed at reducing total emissions of NOx from fixed sources from 35,266 tons/yr in 1972 to 6542 tons/yr in 1981 and moving sources from 18,329 tons/yr to 933 tons/yr.

50052 **APTIC NO. 72111**

Yao Municipal Office, Dept. of Public Economy, Section of Environmental Pollution Control (Japan)

PUBLIC NUISANCE IN YAO CITY IN 1973. *(Yao-shi no kogai). Text in Japanese. 146p., 1974.*

A survey in 1972 revealed that there were 522 registered businesses in Yao city with 1290 facilities emitting dusts and 1123 facilities emitting harmful substances. Heavy oil and coke consumption increased from 47,000 kl and 2000 tons to 61,000 kl and 4255 tons, respectively, whereas coal consumption decreased from 500 tons to 8 tons from 1967 to 1972. The total sulfur oxides emission remained at about 2000 tons/yr during the same period. The average SOx concentration measured at 10 locations by lead dioxide method decreased from 0.98 mg sulfur trioxide/day/100 sq cm in 1967 to 0.57 mg SO3/day/100 sq cm in 1972. The average airborne particulates concentration decreased from 0.277 mg/cu m to 0.077 mg/cu m during the same period. The monthly average nitrogen dioxide concentration measured at Yao Health Center from May 1972 to March 1973 ranged from 0.042 ppm in May to 0.018 ppm in November. There were 35 forecasts, 17 warnings, and 1 alert for photochemical smog in 1973.

50053 **APTIC NO. 75068**

Office of Air and Waste Management, Research Triangle Park, N. C., Monitoring and Data Analysis Div.

MONITORING AND AIR QUALITY TRENDS REPORT, 1973 (FINAL REPORT). *Rept. EPA-450/1-74-007, 338p., Oct. 1974. 22 refs.*

NTIS: PB 240462/AS

A comprehensive tabulation of the nation s air quality and monitoring activities for 1973 is presented. Data on suspended particulates, sulfur dioxide, carbon monoxide, oxidants, and nitrogen dioxide are obtained from monitoring activities conducted by federal, state, and local air pollution control agencies and are compiled according to the nation s 246 Air Quality Control Regions. The general trend in pollutant concentrations for the nation is downward. The 24-hour suspended particulate standard was exceeded by less than 1/10 of the total stations reporting (303 out of 3380), and the 24-hour SO2 standard was exceeded at approximately 3% of the total stations reporting (59 out of 1623). The 8-hour CO standard was exceeded at 153 stations representing 53 Air Quality Control Regions. The 1-hour total oxidant/ozone standard was exceeded at 163 of 187 stations reporting.

1973

50054 **APTIC NO. 72113**

Amagasaki Municipal Office, Bureau of Life and Environment (Japan)

REPORT OF AIR POLLUTION MEASUREMENT IN 1973, NO. 7. *(Showa 47 nendo sokutei kekka hokoku). Text in Japanese. 31p., Aug. 1973.*

Measurement results of air pollutants including sulfur oxides, nitrogen dioxide, nitric oxide, nitrogen oxides, airborne particulates, carbon monoxide, and oxidants as well as wind velocity, temperature, and humidity are given. The measurements were carried out at the central monitoring station at the center of Amagasaki city from April 1973 to March 1974. The highest monthly average SOx concentration was 0.41 ppm in April and the lowest 0.22 ppm in July. The highest monthly average NO2 concentration was 0.068 ppm in March and the lowest 0.018 ppm in May. The highest monthly average NO concentration was 0.080 ppm in December and the lowest 0.015 ppm in May. The highest monthly average NOx concentration was 0.14 ppm in December and the lowest 0.033 ppm in May. The highest monthly average airborne particulates concentration was 0.16 mg/cu m in December and the lowest 0.06 mg/cu m in March. The highest monthly average CO concentration was 5.1 ppm in July and the lowest 1.6 ppm in October. The highest monthly average oxidants concentration was 0.041 ppm in May and the lowest 0.010 ppm in February. The average wind velocity ranged from 3.4 m/sec in July to 1.4 m/sec in November.

50055 **APTIC NO. 72284**

Obihiro Municipal Office, Dept. of Citizens, Section of Traffic and Environmental Pollution Control (Japan)

PRESENT CONDITION OF PUBLIC NUISANCE IN OBIHIRO CITY IN 1973. *(Obihiro-shi ni okeru kogai no genjo). Text in Japanese. 42p., March 1974.*

Coal consumption in Obihiro decreased from 98,000 tons in 1966 to 46,000 tons in 1972, whereas heavy oil consumption increased from 14,313 kl to 59,971 kl during the same period. The monthly average sulfur oxides concentrations measured at 3 locations by lead dioxide method from April 1972 to March 1973 ranged from 0.17 sulfur trioxide mg/day/100 sq cm to 1.16 SO3 mg/day/100 sq cm at the Arisawa Building, from 0.08 SO3 mg/day/100 sq cm to 0.30 SO3 mg/day//100 sq cm at Otani Junior College, and from 0.04 mg/day/100 sq cm to 0.21 SO3 mg/day/100 sq cm at the Tochibayashidai residential quarter. The average dust emissions at the three locations were 6.94 ton/sq/km/mo, 449 ton/sq km/mo and 3.79 ton/sq/km/mo, respectively. The carbon monoxide concentration from automobile exhaust measured at busy intersections in June was as high as 4.0 ppm while nitrogen dioxide and nitric oxide were as high as 0.047 ppm and 0.070 ppm, respectively.

1970

50056 **APTIC NO. 71858**

Schaad, R. and A. Gilgen

BENZO(A)PYRENE IN SETTLING DUST IN ZURICH. *(3,4-Benzypren im Staubsediment von Zurich). Text in German. Atmos. Environ., vol. 4:489-500, 1970. 21 refs.*

The water-insoluble fraction of settling dust sampled by Bergerhoff devices in different zones of Zurich, Switzerland, and in a rural area during the period of June 1965 through May 1966 was analyzed for benzo(a)pyrene by fluorescence spectrophotometry. The average benzo(a)pyrene contents in the dust were 13 micrograms/g in summer, and 20.6 micrograms/g in winter, against 6.1 micrograms/g and 9 micrograms/g for the corresponding periods in a rural area. The benzo(a)pyrene fallout was 369 micrograms/sq m/180 days in the summer period, and 369 micrograms/sq m/180 days for the enture town. The summer and winter averages determined for the rural area were 94.8 and 76.2 micrograms/sq m/180 days, respectively. In Zurich, the annual average benzo(a)pyrene fallout was 745.7 micrograms/sq m in zones with high traffic density, and 488.8 micrograms/sq m in zones with low traffic density. The effect of traffic prevails over those of domestic heating and industry-generated emissions.

ATMOSPHERIC INTERACTION

1975

50057 **APTIC NO. 71643**

Birkle, Michael

IMMISSION MEASUREMENTS OF O3 FOR DETERMINATION OF PHOTOCHEMICAL CONVERSION IN CLOSE TO GROUND AIR LAYERS. *(Immissionsmessungen von O3 zur Erfassung photochemischer Umsetzungen in bodennahen Luftschichten). Text in German. Staub, Reinhaltung Luft, 35(2):41-45, Feb. 1975. 20 refs.*

Selective ozone measurements with a chemiluminescence analyzer were taken in Mannheim and Karlsruhe, Federal Republic of Germany, intermittently from 1972 to 1974. In addition, the concentrations of nitric oxide, nitrogen dioxide, totatl sulfur compounds, dust, carbon monoxide, carbon dioxide, and total hydrocarbon compounds were measured along with the barometric pressure and temperature. The results of the O3 measurements were classified by diurnal fluctuations. Three different groups of diurnal fluctuations coud be distinguished, bad weather diurnal fluctuations which could be observed on rainy days with strong winds, good weather diurnal variations occurring on sunny days with no winds, and all combinations of bad weather and good weather diurnal variations. The possibilities of smog prediction and warning are discussed.

50058 **APTIC NO. 72309**

Day, J. P., M. Hart, and M. S. Robinson

LEAD IN URBAN STREET DUST. *Nature, vol. 253:343-345, Jan. 31, 1975. 11 refs.*

Dust samples from roads and streets, playgrounds, gardens, and wasteland areas in urban Manchester were collected and analyzed for lead. The average lead concentration in the urban dust was 970 ppm as compared to an average concentration of 85 ppm for dust samples from surrounding rural areas. Variations in lead concentration for the different urban samples collected were not significant. The geographical distribution of lead contamination suggested that much of the lead was airborne for periods of up to several weeks, thus accounting for the reasonably uniform dispersal observed. The accidental ingestion of dirt or dust by children playing in the lead contaminated area appears to be capable of causing a significant increase in daily lead intake. An accidental ingestion of 100 micrograms of lead is not considered unlikely for a child playing in an urban playground.

50059 **APTIC NO. 72267**

Druilhet, A., D. Guedalia, B. Rouzaud, J. M. Boyer, and J. Fontan

TWO EXPERIMENTAL METHODS FOR THE REAL-TIME ANALYSIS OF DISPERSION FROM A PUNCTIFORM SOURCE. *(Deux methodes experimentales d analyse en temps reel de la dispersion a partir d une source ponctuelle). Text in French. Atmos. Environ., 9(2):201-209, Feb. 1975. 13 refs.*

Two experimental methods for investigating atmospheric diffusion in real time are proposed. One method is based on the use of a short-lived radioactive gas, thoron. This gas is particularly well suited for the study of small-scale diffusion (from 0-1 km). The second method uses a zinc cadmium sulfide tracer and allows for diffusion studies at a larger scale. The time constant of detection is about 1 sec. The two techniques can be combined to study the deposition of aerosols.

50060 **APTIC NO. 72363**

Fanaki, F. H. and G. Lesins

PHOTOGRAPHIC MEASUREMENT OF SMOKE PLUME HEIGHTS FROM INDUSTRIAL STACKS. *J. SMPTE (Soc. Motion Pict. Telev. Eng.), vol. 84:77 81, Feb. 1975. 4 refs. (Presented at the Society of Motion Picture and Television Engineers Technical Conference, Toronto, Ontario, Nov. 13, 1974.)*

A technique for the photographic measurement of the height of smoke plumes from industrial stacks is described. A single-camera technique is used in which the camera is placed so that its axis is perpendicular to the plume path. This requires the measurement of the direction of wind at the stack exit. The camera is mounted to a theodolite which is rotated 90 deg from this bearing towards the smoke plume source. The plume was photographed every 30 sec over a period of at least 30 min. By superimposing several photographs and tracing the plume outlines a time mean path of the plume was obtained. There are some sources of error due to fluctuations in wind direction, distortion and visibility of the plume image, camera orientation, and data reductions. Techniques for minimizing the errors are discussed.

50061 **APTIC NO. 72241**

Kurihara, Jiro and Tadashi Ishikawa

RECORDER FOR ATMOSPHERIC STABILITY. *(Taiki anteido kiroku sochi). Text in Japanese. (Koshin Electric Industrial Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-1014. 6p., Jan. 11, 1975. (Appl. Feb. 28, 1970, 1 claim).*

An automatic recording device for atmospheric stability as a function of wind velocity and insolation intensity was developed. The device consists of a wind velocity comparison circuit with amplifiers OP1, OP2, OP3, and OP4 each set with certain voltages, and relays R1, R2, R3, and R4 actuated by amplifiers and an insolation intensity comparison circuit with amplifiers OPa, OPb, and OPc each set with certain voltages and relays Ra, Rb, and Rc. When the voltages proportional to wind velocity and insolation intensity are applied to the wind velocity comparison circuit and insolation intensity comparison circuit respectively, one of seven circuits formed by the combination of contacts S1, S2, S3, and S4 actuated by R1, R2, R3, and R4 and Sa, Sb, and Sc actuated by Ra, Rb, and Rc is connected, thus giving the voltage corresponding to the wind velocity and insolation intensity, which is recorded by an automatic equilibrium recorder.

50062 **APTIC NO. 72375**

Lal, M.

A BOUNDARY LAYER MODEL FOR THERMAL EFFECTS OF POLLUTANTS IN THE ATMOSPHERE. *Arch. Meteorol. Geophys. Bioklimatol., Ser. B., 23(1-2):59-68, 1975. 14 refs.*

An urban boundary-layer model is comprehensively described. The model has been tested with data from Jodphur to estimate the thermal effects of pollutants on the boundary layer over periods of 1 to 2 days. The test simulation reveals that the maximum surface temperature is considerably reduced due to air pollution.

50063 **APTIC NO. 72400**

Li, Ta-Yung and H. E. Landsberg

RAINWATER PH CLOSE TO A MAJOR POWER PLANT. *Atmos. Environ., 9(1):81-88, Jan. 1975. 17 refs.*

The pH distribution of rain from heavy summer showers was measured over a network of rain gauges located 0.5-5 km from a 710 MW power plant in South Maryland. The acidity values ranged from 3.0-5.7, with modal values varying between 3.6 and 4.0. A notable wind dependence of the acidic washout from the plume was evidenced by high pH values recorded east of the power plant stacks in the presence of a west-northwest wind and high values recorded to the south-southeast during a north-northeast wind. Rainwater pH values dropped off concentrically from the source during calm conditions. (Author abstract modified)

50064 **APTIC NO. 72128**

Malissa, H., W. Juette, and I. Alidad

INVESTIGATION OF THE VERTICAL NITROGEN DIOXIDE DISTRIBUTION ABOVE A FREQUENTED STREET. *(Untersuchung der Vertikalverteilung von Stickstoffdioxid ueber einer verkehrsreichen Strasse). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. B, 23(1-2):127-136, 1975. 12 refs.*

Knowledge of the vertical nitrogen dioxide concentration profile in the atmosphere within a street canyon would enable the estimation of pollutant concentrations in street site living or working rooms and furthermore the calculation of pollutant concentrations at ground level from data measured at roof levels by means of long-line remote sensing methods. A formula was therefore derived under simplified conditions and examined by simultaneous measurements of the nitrogen dioxide concentration, wind velocity, and wind direction at roof level and ground level. The data thus obtained were average values for half an hour. The knowledge of the local vertical wind profile and the influence of the traffic density in neighboring urban areas is essential for the calculation. The verification of the derived model shows a correlation coefficient of r equals 0.88 between calculated and measured data.

50065 **APTIC NO. 72340**

Manabe, Syukuro and Richard T. Wetherald

THE EFFECTS OF DOUBLING THE CO2 CONCENTRATION ON THE CLIMATE OF A GENERAL CIRCULATION MODEL. *J. Atmospheric Sci., 32(1):3-15, Jan. 1975. 26 refs.*

The climatic effects of doubling the carbon dioxide concentration in a highly simplified three-dimensional general circulation model were analyzed. The concentration of CO2 may increase as much as 20% during the latter half of this century as a result of fossil fuel combustion. The model contains these simplifications: a limited computational domain, an idealized topography, no heat transport by ocean currents, and fixed cloudiness. The CO2 increases the temperature of the model troposphere, but it lowers that of the model stratosphere. The tropospheric warming is somewhat larger than that expected from a radiative-convective equilibrium model. The increase of surface temperature in higher latitudes is magnified due to the recession of the snow boundary and thermal stability of the lower troposhere which limited convective heating to the lowest layer. The doubling of CO2 significantly increases the intensity of the hydrologic cycle of the model. (Author abstract modified)

50066 **APTIC NO. 72402**

Nicholson, Sharon E.

A POLLUTION MODEL FOR STREET-LEVEL AIR. *Atmos. Environ., 9(1):19-31, Jan. 1975. 16 refs.*

A scalar budget-box diffusion model is developed to predict volume-average pollution concentrations in street canyons. Input is wind speed, direction, and total pollution emission at the lower boundary of the box. Vortex velocity is predicted by assuming logarithmic wind profiles above buildings and streets and by using the continuity equation. A bulk wind speed for winds parallel to the street is predicted by assuming an exponential wind profile in the canyon. Diurnal curves showing predicted and observed hourly values of carbon monoxide in Madison, Wisconsin; Chicago, Illinois; and Frankfurt, Germany are in reasonable agreement, indicating the usefulness of the model for vastly differing cities. (Author abstract modified)

50067 **APTIC NO. 71539**

Riches, Michael R., James T. Peterson, and Edwin C. Flowers

A STUDY OF THE EFFECT OF ATMOSPHERIC AEROSOLS ON INFRARED IRRADIANCE AT THE EARTH S SURFACE IN A NON-URBAN ENVIRONMENT. *Preprint, North Carolina State Univ., Raleigh, Dept. of Geosciences and Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab., 40p., 1975. 50 refs.*

The effect of atmospheric aerosols on infrared irradiance at the earth s surface in a non-urban environment was investigated. Hemispheric infrared downward-directed irradiance at the earth surface and ambient aerosol concentrations were measured at Research Triangle Park, N. C. The expected incident infrared irradiance was calculated from prevailing atmospheric conditions. The observed minus-calculated downwelling irradiances were compared to concurrent measurements of the turbidity. The extent to which incident hemispheric infrared radiation is affected by varying amounts of atmospheric aerosols and relative humidity was determined. For a typical hazy summer afternoon with 0.250 turbidity and 0.2/km extinction coefficient the excess downward directed irradiance was approximately 0.03 ly/min, which is 6% of typical downward infrared irradiances. A non-linear dependence of excess downwelling irradiance on relative humidity was suggested. (Author abstract modified)

50068 **APTIC NO. 72401**

Scriven, R. A. and B. E. A. Fisher

THE LONG RANGE TRANSPORT OF AIRBORNE MATERIAL AND ITS REMOVAL BY DEPOSITION AND WASHOUT - II. THE EFFECT OF TURBULENT DIFFUSION. *Atmos. Environ., 9(1):59-68, Jan. 1975. 15 refs.*

A diffusion approximation is used to estimate long distance transport of air pollution in the mixing layer in order to assess the accuracy of a simple box model for such predictions and to investigate the buffering effect of diminishing atmospheric turbulence as the absorbing ground or sea is approached from above. In the absence of rain or chemical reactions, mean travel distances for sulfur dioxide of 700 km are demonstrated when vertical diffusion is limited by an inversion at a height of about 1 km. Background concentrations travelling over such distances are reduced in magnitude by a factor of about 4. The effective deposition rate for long distance travel appears to be largely governed by the diffusive resistance of the low turbulence region adjacent the surface and is fairly insensitive to details of surface roughness. Overall deposition velocities for SO2 turn out to be 1 cm/sec or less. The assumption of constant net vertical flux near the ground and far from the source is shown to be valid, confirming conventional methods of deducing deposition velocities from measurements of concentration and velocity profiles. (Author abstract modified)

50069 **APTIC NO. 72222**

Wadden, R. A.

CALCULATED DISTRIBUTION CHARACTERISTICS FOR A REINFORCED COAGULATING AEROSOL AT STEADY STATE. *J. Atmospheric Sci., 32(1):102-107, Jan. 1975. 20 refs.*

The steady-state number balance for a reinforced coagulating aerosol, with particle removal at some selected size, was solved as a continuous function of particle volume. Using a variety of log-normal feed distributions, a power law relationship between particle concentration and volume was demonstrated, regardless of feed distribution shape. The standard deviation of the feed distribution was varied from 1.21 to 20.09, and the slopes of the calculated distributions varied with the standard deviation. The slope of the log of the particle concentration versus the log of the particle volume approached - 1.5 for standard deviations less than 2, while for standard deviations greater than 8.0, the slope approaches - 1.0. Calculated distribution slopes for standard deviations less than 2 were similar to those of atmospheric distributions reported for stable meteorological conditions. The time to reach steady state was estimated and found to be reasonable compared to meteorological time scales. Thus, the Junge power law relationship observed in many atmospheric size distributions appears to be explained principally by the coagulation mechanism. (Author abstract modified)

50070 **APTIC NO. 71786**

Warner, Peter O., James O. Jackson, Larry Saad, and Alan Greenberg

MEASUREMENT OF THE INFLUENCE OF A CEMENT KILN STACK ON A SURROUNDING RESIDENTIAL COMMUNITY BY INJECTION OF AN IDENTIFICATION PARTICULATE. *Am. Ind. Hyg. Assoc., J., 36(1):32-38, Jan. 1975. 3 refs.*

Barium sulfate tracer was injected into the kiln stack of a large cement plant in order to determine the effect of stack particulate emissions on an immediately surrounding residential community. Meteorological conditions at the time of injection favored deposition of the stack plume fallout directly over the 7.75 sq km sampling area. Dustfall measurements revealed no evidence of detectable barium tag-particulate within a 24-hour period following stack injection. Dustfall calcium content, as measured by atomic absorption, was also at background levels. Suspended particulates showed a 1% (by weight) content of stack-relatable material at locations 1.6 km downwind of the stack.

50071 **APTIC NO. 722[illegible]**

Wilkniss, Peter E., John W. Swinnerton, David J. Bressan, Robert A. Lamontagne, and Reginald E. Larson

CO, CCL4, FREON-11, CH4 AND RN-222 CONCENTRATIONS AT LOW ALTITUDE OVER THE ARCTIC OCEAN IN JANUARY 1974. *J. Atmospheric Sci., 32(1):158-162, Jan. 1975. 10 refs.*

Samples of atmospheric radon, carbon monoxide, methane, Freon-11, and carbon tetrachloride were taken at various altitudes over the Arctic Ocean north of the Greenland Sea. The concentrations of these gases are tabulated and were correlated and interpreted with respect to varying meteorological conditions related to air mass movements. Pronounced concentration gradients were seen in frontal zones, and evidence is found for low-level flow of continental air, both from North American and Europe, into the Arctic region. Arctic air contains more Rn, CO, and CH4 in winter than in summer. The Arctic Ocean could act as a sink, rather than a source, for atmospheric CO during winter months. The rapid transport of Freon-11 from Europe to the Arctic is also in evidence, while the observed behavior of CCl4 is difficult to interpret. (Author abstract modified)

50072 **APTIC NO. 72126**

Yap, David

SEASONAL EXCESS URBAN ENERGY AND THE NOCTURNAL HEAT ISLAND - TORONTO. *Arch, Meteorol. Geophys. Bioklimatol., Ser. B, 23(1-2):69-80, 1975. 17 refs.*

The nocturnal boundary layer concept is used to study the seasonal excess urban energy necessary to generate similar and observed heat island intensities in winter and summer for Toronto. The summer urban excess heat was estimated to be at most only 0.3 that of winter. Anthropogenic heat releases appear to be sufficient to account for this excess heat in both seasons but other sources of energy are probably equally important for the summer nocturnal situation.

1974

50073 **APTIC NO. 71531**

Ackerman, Bernice

WIND PROFILES AND THEIR VARIABILITY IN THE PLANETARY BOUNDARY LAYER. *In: Preprint, American Meteorological Society, p. 19-22, 1974. 2 refs. (Presented at the Atmospheric Diffusion and Air Pollution Symposium, Santa Barbara, Calif., Sept. 9-13, 1974.)*

Wind profiles in the lowest 1500 m obtained from 168 balloon soundings (double-theodolite tracking) on three fair weather afternoons during the summers of 1971 and 1972 in the St. Louis region are presented. The profiles undergo small, but significant, changes as the air passes over the urban St. Louis complex. The changes are larger and more apparent on days with low level instability. After passage over the city, the winds tend to be to the left of the upwind rural area. Winds over the central city and over suburban areas downwind of the city appear to have greater temporal variability than in nearby rural surroundings. Conditions at suburban sites other than downwind of the city are about the same as at upwind rural locations and sometimes even more quiescent.

50074 **APTIC NO. 71987**

Ackerman, Bernice

SPATIAL VARIABILITY OF THE WIND VELOCITY IN THE LOWEST 500 METERS. *Preprint, American Meteorological Society, Boston, Mass., p. 325-328, 1974. 3 refs. (Presented at the Conference on Aerospace and Aeronautical Meteorology, 6th, El Paso, Tex., Nov. 12-15, 1974.)*

Data on the frequency distribution of wind speed and wind direction at levels of 150, 300, and 500 m were obtained with balloon releases over the St. Louis area during 1971-1972 and 1973. The effects of man-made surfaces on the airflow were investigated by examining subsets of data for urban and rural areas in the region. Differences in wind speed between the two areas varied from 0.3-1.1 m/sec. with the rural value being larger than the metropolitan value in each case. The direction ranges, on the other hand, were larger over the metropolitan area and varied from 2-10 deg in two 1973 data samples and by about 15 deg in a 1971-72 sample. Average ranges were determined for a small matched data set drawn from the same set of days to remove the possible influence of mean network speed, station density, and area coverage. In agreement with the total sample, the average direction range over the metropolitan area was larger than over the rural area. However, the wind speed range was also larger over the metropolitan area in contrast to the reverse being true for the total sample. The size of the area appears to strongly influence the range in wind speed. Mean deviations of wind direction were twice as large on rainy days as on fair days, while the mean deviations of wind speed were 1/3 to 2/3 smaller on rainy days.

50075 **APTIC NO. 71537**

Changnon, Stanley A., Jr.

INCREASES IN MODULATED TEMPERATURES - AN INDICATION OF INADVERTENT CLIMATE MODIFICATION? *In: Preprint, American Meteorological Society, Boston, Mass., p. 155-158, 1974. 11 refs. (Presented at the Atmospheric Diffusion and Air Pollution Symposium, Santa Barbara, Calif., Sept. 9-13, 1974.)*

Temperature records for the period 1889-1973 were obtained from Urbana, Illinois, a relatively undisturbed weather station, to examine the possibility of man-induced modulation of temperature. A curve of 5-year moving totals of the total number of months with modulated temperatures clearly portrays their increasing frequency with time. Examination of frequencies of cloudy days over the period of 1901-1973 indicates that cloudiness (both natural and man-made) explains about 15% of the variation in the frequency of modulated temperature. Increased visible emissions, as determined from smoke-haze curves, appear to account for 10% of the increase in modulated temperatures. Correlations between increased dust storm activity, increases in modulated temperatures, and increased haze indicate that the peaks in smoke- haze conditions are not entirely relatable to atmospheric pollutants from combustion.

50076 **APTIC NO. 71538**

Changnon, Stanley A., Jr.

A REVIEW OF INADVERTENT MESOSCALE WEATHER AND CLIMATE MODIFICATION AND ASSESSMENT OF RESEARCH NEEDS. *Preprint, American Meteorological Society, Boston, Mass., p. 347-353, 1974. 47 refs. (Presented at the Conference on Weather Modification, 4th, Ft. Lauderdale, Fla., Nov. 18-21, 1974.)*

The effects of urban industrial activities and rural land-use changes on weather modification are examined. The temperature within a moderate to large sized urban area (100,000 population) is generally higher at any given time of the day or season than it is in rural areas due to the urban heat island effect. Various urban-industrial conditions affect clouds, precipitation, and related severe weather patterns. Large power plant complexes release heat equal to 10% of the solar energy absorbed in their immediate vicinity. Suspected atmospheric effects from effluents of we and dry cooling towers include the localized production of fog, icing, clouds, rain, and snow. Non-urban land-use changes such as deforestation, drainage of bogs and swamps, residue burning, irrigation, and the use of crop sprays also effect weather changes that appear to be local, regional, and global in extent. Rainfall studies in Arizona suggest that aerosols from open burning affect raindrop size, rain rates, and total rainfall.

50077 **APTIC NO. 71874**

Crutzen, P. J.

ESTIMATES OF POSSIBLE FUTURE OZONE REDUCTIONS FROM CONTINUED USE OF FLUORO-CHLORO-METHANES (CF2CL2, CFCL3). *Geophys. Res. Lett., 1(5):205-208, Sept. 1974. 11 refs.*

The mechanism and kinetics of atmospheric reactions of fluorochloromethanes are considered in terms of estimating possible future ozone reductions. The continued use of the halogenated methanes is estimated to reduce the total column abundance of ozone in the atmosphere by about 10%, assuming that the present rates of production of difluorodichloromethane and trichlorofluoromethane remain unaltered. The largest reductions in ozone appear above 30 km as a result of the dissociation of the halogenated methanes into the ozone-attacking species chloride radical and chloroxy radical. Below 30 km, ozone reductions are much smaller, and slight increases are even possible due to the deeper penetration of the ozone-reducing ultraviolet radiation in the 2000-2300 A region. The resulting changes in the ozone profile may alter heating rates and the stratospheric climate.

50078 **APTIC NO. 71754**

Fujitani, Y. and Y. Izuhara

POLLUTION CHARACTERISTICS DURING NEW YEAR S HOLIDAYS IN NAGOYA DISTRICT. *(Nenmatsu nenshi ni okeru osen kyodo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):511, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 358.)*

Concentrations of sulfur dioxide and carbon monoxide in Nagoya District, Japan were monitored continuously at four stations during a 3-week period from mid-December 1972 to early January 1973. Average daily pollutant concentrations were plotted against wind velocity on log-log graph paper. During the New Year s holidays, when activity was at a minimum, linear relationships were discerned between the log of wind velocity and the log of SO2 or CO concentration. Pollutant concentrations during the three-week period ranged from 0.008 ppm-0.15 ppm for SO2, and from 1.5 ppm-7 ppm for CO. In general, as wind velocity increased, pollutant concentration decreased.

50079 **APTIC NO. 71873**

Goldreich, Yair

OBSERVATIONS ON THE URBAN HUMIDITY ISLAND IN JOHANNESBURG. *Israel J. Earth Sci., 23(1-2):39-46, 1974. 10 refs.*

Mobile meteorological observations were performed in Johannesburg during December 1966 and June 1967 to study the effect of the central business district on humidity. The humidity mixing ratio and the relative humidity excess were determined from an analysis of the resulting multiple regression equations. A distinct humidity mixing ratio island appeared above the central business district at sunrise and in the early afternoon during both summer and winter. The humidity mixing ratio in the summer was highest in the northern valleys and decreased southwards towards the city, where it increased in the central area with the occurrence of high buildings. The humidity island in the winter was most pronounced during the day. A mapping of the relative humidity rather than humidity mixing ratio indicated that the relative humidity was higher in the central business district than in the rural surroundings during the daytime in winter. Thus, despite the high city temperatures by day, the increasing humidity mixing ratio was sufficient to maintain a high relative humidity.

50080 **APTIC NO. 71795**

Gondi, Sandor

HIGH STACKS FOR ENVIRONMENTAL PROTECTION. *(Magaskemenyek a kornyezetvedelemben). Text in Hungarian. Banyasz Kohasz. Lapok - Kohaszat, 107(9):372-379, 1974. 17 refs.*

Different types of plume dispersion and formulas for the calculations of the necessary stack height to abate sulfur dioxide and dust emissions are described. When calculating stack heights, it is necessary to consider not only the dominant wind speed and wind direction, but also the frequency and localization of different types of thermal stratifications and atmospheric turbulence. The use of high stacks is limited by the necessity to maintain a minimum discharge rate or superelevation even under partial load conditions, and by the stresses occurring in high stacks under different temperature and wind conditions. Also, the construction of high stacks is limited by economic considerations because investment costs increased rapidly with increasing height.

50081 . **APTIC NO. 72080**

Hevesi, Istvan

THE ROLE OF NATURAL PARKS AND GREENBELTS IN ENVIRONMENTAL PROTECTION. *(A parkerdok es vedelmi rendeltetesu erdok szerepe a kornyezetvedelemben). Text in Hungarian. Tatabanyai Szenbanyak Muszaki-Kozgazdasagi Kozl., 14(2-3):85-88, April- Sept. 1974.*

The role of natural parks and greenbelts in environmental protection is described with regard to the situation in highly polluted Komarom County in Hungary. Greenbelts and forests affect the air humidity and temperature, and facilitate air exchange, which is most essential for polluted urban areas in summer. In addition, forests satisfy an important need of urban dwellers for recreation in a natural, non-polluted environment.

50082 **APTIC NO. 71908**

Hilst, Glenn R.

THE CHEMISTRY AND DIFFUSION OF AIRCRAFT EXHAUSTS IN THE LOWER STRATOSPHERE DURING THE FIRST FEW HOURS AFTER FLY-BY. *Aeronautical Research Associates of Princeton, Inc., N. J., National Aeronautics and Space Administration Contract NASI-12475, A.R.A.P. Rept. 216, CR-132514, 76p., July 1974. 19 refs.*

NTIS: N74-34114

The chemistry and diffusion of aircraft exhausts in the lower stratosphere are theoretically examined in connection with the possibility of ozone depletion by supersonic aircraft. The hydrogen-nitrogen-oxygen reaction systems in the lower stratosphere are examined in terms of their perturbation by aircraft engine exhaust plumes, and the joint effects of diffusive mixing and chemical kinetics on reactions between exhaust species and atmospheric ozone are analyzed using a second-order closure diffusion/chemistry model. Estimates of nitrogen oxide emissions and initial plume NOx concentrations in the core of the post-vortex plume are between 10 to the 12 and 10 to the 14 molecules/cu cm. When NOx concentrations exceed 10 to the 12 molecules/cu cm, ozone concentrations are rapidly suppressed, and nitric acid formation is inhibited. When NOx conentration exceeds 10 to the 13 molecules/cu m, ozone destruction is essentially complete, resulting in an ozone-hole in that region (generally the plume core). Thus, under reasonable emission rates of nitric oxide, a significant ozone-hole appears possible. Significant conversion of NOx to HNO3 during the first few sunlit hours after fly-by appears possible only under extreme concentrations of water vapor and/or photolysis rates and minimum NO emissions.

50083 **APTIC NO. 72092**

Hogstrom, Ulf

TRANSPORT AND DISPERSAL OF ODORS. *In: Human Responses to Environmental Odors. Amos Turk, James W. Johnston, Jr., and David G. Moulton (eds.), New York, Academic Press, 1974, p. 163-198. 13 refs.*

An odor dispersion model is described that predicts the occurrence of instantaneous concentrations equal to or above the absolute odor threshold level. The characteristics of the dispersion atmospheric flow are assumed to be governed by: the overall flow (geostrophic wind), the local stability, and the roughness of the ground. Field measurements indicate that up to several kilometers distance from the source, predicted odor frequencies are obtained that do not significantly deviate from observed frequencies. At larger distances, the observed odor frequencies are larger than those calculated by a factory of two or three. Examples of modifications to the odor dispersion model for use with a yet undeveloped odor-dose description are provided.

50084 **APTIC NO. 71707**

Hosokawa, Y., S. Izumi, M. Takarada, T. Yoshida, S. Hayakari, and K. Seki

RESEARCH ON REGIONAL REPRESENTATION OF ATMOSPHERIC SO2 CONCENTRATION IN HACHINOHE REGION (REPORT NO. 2). *(Hachinohe chiku ni okeru aryusan gasu nodo no chiiki daihyosei ni kansuru kenkyu (Dai-2-ho)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution) 9(2):507, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 354.)*

The relationship of sulfur dioxide concentration to wind direction and velocity, and long-term tendencies and the seasonal, cyclical nature of SO2 concentrations were investigated in the Hachinohe region, Japan. While SO2 concentrations have decreased since 1970, a leveling-off effect is now noted. Pollutant concentrations show meteorological dependence and exhibit cyclical behavior over the years.

50085 **APTIC NO. 71708**

Ihata, Y., D. Okayasu, and Y. Kurosaka

RESEARCH ON AIR POLLUTION IN TOYONAKA CITY (REPORT NO. 2). ON AIR POLLUTION PHENOMENA. *(Toyonaka-shi no taiki osen kenkyu (Dai-2-ho). Taiki osen gensho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):509, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 356.)*

Air pollution phenomena due to sulfur dioxide in Toyonaka City, Japan, are described. A combination of wind direction and presence of inversion layers can cause high ground-level pollution, even when pollution sources are minor upwind. High pollutant concentrations are not solely the product of city pollution sources. Maps of wind and pollution patterns are included.

50086 **APTIC NO. 71750**

Ihata, Y., D. Okayasu, and Y. Kurosaka

RESEARCH ON AIR POLLUTION IN TOYANAKA CITY (REPORT NO. 1). ON SO2 CONCENTRATION DISTRIBUTION IN UPPER AIR. *(Toyonaka-shi no taiki osen kenkyu (Dai-ichi-ho). Joku SO2 nodo bunpu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):508, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 355.)*

Relationships between air currents and upper air sulfur dioxide concentrations in Toyonaka were studied in December 1972 and August 1973. Meteorological data as well as concentration measurements in horizontal and vertical directions were collected and analyzed. Between inversion layer at altitudes near 200 m-600 m and 1000 m, a sharp inversion settling (5.7 C) occurs. A high pollutant concentration region was observed in the upper air, which corresponded to the presence of inversion layers. By circulation of land breezes in a U-turn fashion, ground pollution is affected. Maps of SO2 concentration distributions are included.

50087 **APTIC NO. 71755**

Ikezawa, S., K. Kobayashi, and S. Tsujimoto

ON AIR POLLUTION CHARACTERISTICS IN HIGASHI-HARIMA AREA. *(Higashi-Harima chiiki ni okeru taiki osen tokusei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):504, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 348.)*

Statistical evaluation of sulfur dioxide concentration measurements with respect to wind direction, wind velocity, time of year, and time of day was conducted on data from four monitoring stations in the Higashi-Harima Area, Japan. Two locations showed similar pollution patterns during summer and autumn. Two other locations showed opposite pollution patterns--summer behavior for one was winter behavior for the other, and vice versa.

50088 **APTIC NO. 72101**

Irie, T., S. Yoshizawa, and S. Ozao

CHARACTERISTICS OF POLLUTANT DISPERSION WITHIN CHANNEL SPACES (3). *(Mizo-jo kukannai no osen kakusan no seijo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):293, Nov. 1974. 1 ref. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 148.)*

The pollutant dispersion in channel spaces 100 mm in width (l) and 150 mm in depth (d) was experimentally investigated. The stagnant region in d equalling 150 channel space is similar to that of d equalling 200 channel space. The average concentration (C) was inversely proportional to wind velocity (U); however this tendency diminished with an increase of d/l resulting from the appearance of a stagnant region. Based on the assumption of instantaneous uniform dispersion, the ventilation frequency (n) of the entire channel space is inversely proportional to C and proportional to U. The ventilation frequency N, based on the assumption of four-section circulation flow, was higher; average N/n values were in the range of 1.40-3.16. The recirculation rates due to a vortex in the channel space were also calculated. The boundary between the upper mixed region and lower stagnant region was determined by d/l ratio, wind velocity, and dispersion coefficient. In the case of this experiment, the boundary layer was at d/l equalling 1.

50089 **APTIC NO. 72052**

Kamata, M.

FUNDAMENTAL STUDIES ON GAS DIFFUSION NEAR BUILDINGS. EXPERIMENTS ON CAVITY BEHIND BUILDING. *(Tatemono kinbo ni okeru osenbutsu kakusan ni kansuru kiso kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):306, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 161.)*

Two-dimensional rough plates 15 mm in thickness were placed in a wind tunnel at a distance between each other 4 times the height of the plate, and various wind tunnel air streams were made according to logarithmic law. Two-dimensional and three- dimensional plate models (12 by 1.8 cm and 18 by W by 1.8 cm, where W equals 9, 18, 36, 72 cm) were then placed in the wind tunnel, and the cavity was calculated from the dividing streamline which was determined from average wind velocity. The smaller the ratio of plate height H to plate roughness Z0 was, the smaller were the cavity and contraflow area. A linear relationship was found between cavity size and the turbulent flow Reynold s number obtained for wind velocity distribution (which followed logarithmic law).

50090 **APTIC NO. 72031**

Kaneda, Akira and Yasumitsu Ishizuka

AIR POLLUTION BY ATMOSPHERIC PARTICULATE MATTER IN YONAGO CITY. *(Yonago-shi no taiki osen, fuyu ryushijo bushitsu oyobi sono konyu seibun ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):527, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 375.)*

Airborne particulates collected by a high volume sampler in Yonago city, Tottori Prefecture, were analyzed for sodium, iron, manganese, and lead by atomic absorption spectrometry, and sulfate ion, nitrate ion, chloride ion, and ammonium ion were measured by colorimetry employing appropriate coloring reagents. Meteorological effects on the distribution of particulate matters were also considered. No seasonal difference in total particulate concentration was observed; however, atmospheric humidity affected greatly particulate concentration. When the humidity was more than 90%, the observed total particulate concentration was low; 20 to 60 micrograms/cu m. Wind velocity also affected particulate concentration, and a higher total particulate concentration was generally observed with a wind velocity less than 7 m/sec. The average total particulate concentration in the period from June through December was 110 micrograms/cu m. The average ratio of sodium to chloride ion was 2.3, reflecting the effect of the ocean on the area. The correlation between metals and total particulate concentration is compared. A good correlation was found only between iron and total particulate concentration, and its correlation factor was was 0.9138, however no correlation was found between other pairs of particulates.

50091 **APTIC NO. 72051**

Kannari, A.

EXPERIMENTAL STUDY ON STRUCTURE OF URBAN AIRFLOW. *(Shigaichi kaze no kozo ni kansuru fudo jikken). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):305, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 160.)*

A Gottingen type wind tunnel (cross-section 700 by 1500 mm and length 3370 mm) with barriers 10, 20 and 30 mm in height was used for this study. Wind velocity was measured by an I-type and a X-type constant temperature hot stream meter. The vertical distribution of average wind velocity was in good agreement with previous wind tunnel experiments and actual measurement. The flatness and skewness of the turbulent flow near the barriers differed from that of the normal distribution. Results revealed similarity between the turbulent flows in the barrier space and the covered space.

50092 **APTIC NO. 71676**

Kawamura, T.

SURFACE WIND SYSTEMS IN SOUTHERN AREA OF KANTO PLAIN. *(Kanto heiya nanbu ni okeru chijofukei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(3):562, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 411.)*

The geographical distribution of oxidant concentration is influenced greatly by the local wind system. Out of the high oxidant concentration days recorded during 1972 and 1973, 40 days were selected, and hourly stream line diagrams and oxidant concentration distribution diagrams were prepared using wind velocity, wind direction, and oxidant concentration measured at 100 points. On these days, the weather was mostly sunny, wind velocity was generally low, and sea and land breezes were dominant. Due to the effect of small-scale sea and land breezes at Tokyo and Sagami bays, and large-scale sea and land breeze from the Pacific and large cities such as Tokyo and Yokohama, the diurnal variation in surface wind systems was extremely complicated. The diurnal variations of typical surface wind systems are classified into six stages. The change in wind system occurs with synoptic scale variation in pressure gradient, which determines the direction of sea breeze, thereby varying the locality of high oxidant concentration development.

50093 **APTIC NO. 71678**

Kikuchi R. and S. Okabe

CLIMATOLOGICAL STUDY OF AIR POLLUTION IN CHIBA PREFECTURE (1). *(Chiba-ken no taiki osen no kikogaku-teki kaiseki. Dai-1-ho --- Okishidanto nodo no chiiki sokan ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution). 9(2):569, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 418.)*

Photochemical smog is usually a wide ranging form of pollution; however, in the case of the Chiba-Tokyo bay area, lo-

cally high oxidant concentration develops. The characteristics of oxidant concentration distribution and statistical characteristics of meteorological conditions associated with high oxidant concentration were investigated based on data obtained at photochemical smog monitoring centers and weather stations. The correlation coefficients between maximum oxidant concentration at each measuring point and the Kimitsu measuring point on high oxidant concentration days were calculated. The correlation coefficient distribution showed four regional groups. The frequency of high oxidant concentraiton occurrence according to oxidant concentration distribution pattern was obtained based on 1973 and 1974 data. The meteorological conditions during high oxidant concentration periods differed from area to area, and a close relationship was indicated between concentration distribution and meteorological conditions.

50094 **APTIC NO. 72290**

Kitabayashi, K. and N. Yokoyama

STACK GAS DIFFUSION MODEL FOR INDUSTRIAL COMPLEX. *(Kogyo toshi ikino taiki osen shimureshion moderu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):302, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 157.)*

The yearly average concentration and seasonal average concentration of sulfur oxides as well as a P-C curve for the Mizushima area were studied by using air pollution simulation models consisting of meteorological data, plume diffusion model, and puff diffusion model. The meteorological data used for the study included insolation, wind direction, wind velocity, and wind direction variation width obtained in 1972. Wind velocity was classified into 0-1, 1-3, 3-5, 5-8 and above 8 m/s, and atmospheric stability was determined by the Singer-Smith method. Emission sources used for the diffusion calculation were about 50 stacks each emitting more than 4 N cu m/hr of sulfur oxides. Results showed that the yearly average concentration could be predicted within 10% error. The values above the 95th percentile of the P-C curve were not in good agreement with the observed values.

50095 **APTIC NO. 71681**

Koji, M. and K. Ozaki

SHORT-PERIOD VARIATION OF O3 CONCENTRATION AND WIND SPEED. *(Ozon nodo to fusoku no tanki hendo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):576, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 425.)*

The secondary oxidant concentration peak appearing in the evening after the midday oxidant concentration peak in Kobe is attributed to ozone in the upper atmosphere brought down by atmospheric turbulence. The data on July 26, 1973, when three secondary peaks were observed, were analyzed. The power spectrum analysis indicated the high power at periods (T) 150 min and 60 min. The wind speed at Mt. Rokko showed a similar pattern and a significant correlation was found between O3 concentration and (T) 150 min. However, no particular relationship was found with wind speed at ground level. The vertical share of wind speed showed high power at (T) 150 min, and oxidant concentration increased immediately after the high share. Variation in wind direction at 1600 is high and simultaneously the oxidant concentration increases sharply. The O3 concentration at altitude 1000-3000 ft was not sufficiently high to explain secondary peaks at ground level; however, the O3 concentration increased at lower altitudes.

50096 **APTIC NO. 72057**

Kojima, K. and T. Sekikawa

DIFFUSION OF INLAND POLLUTION TO OCEAN WITH NORTHWESTERLY SEASONAL WIND. *(Hokusei kisetsufuji niokeru rikujo osen no kaijo eno hirogari). Text in Japanese. Taiki Denki Kenkyu (Proc. Soc. Atmos. Electr. Jap.), no. 12:7-12, 1974. 5 refs.*

The aerosol concentration at two islands, Miyakejima and Hachijojima, was measured to see the effect of pollutant diffusion from the mainland. The aerosol level was measured as electroconductivity and the number of total aerosol particles by a Pollack counter. Although some correlation was observed between the aerosol levels measured by two different techniques, there were many discrepancies. Two typical patterns of variation in total aerosol concentration were observed in both islands; steady particle concentration throughout the day and high concentration at a certain hour. These patterns were related to the distribution of atmospheric pressures over Japan, and whenever a seasonal wind blew from the mainland (northwesterly wind), the latter pattern was observed at the islands, while the former resulted from non-northwesterly winds (the aerosol concentration at Hachijojima was 200 N/cu cm with these winds). The highest aerosol level at Hachijojima occurred at 6 pm (1400 N/cu cm) with a northwesterly wind. The peak levels occurred at different hours for different places, and were delayed with increase in the distance from the mainland, indicating the diffusion of pollutants from the mainland to these islands.

50097 **APTIC NO. 69455**

Kuczynski, Eugene R.

METEOROLOGICAL ASPECTS OF AIR POLLUTION. *Instrument Society of America, Pittsburgh, Pa., Instr. Soc. Am. Int. Power Instr. Symp., 7th, Proc., Boston, Mass., 1974, p. 39-43. 7 refs. (May 20-22.)*

Some of the weather factors that influence the dispersion of air pollutants are discussed. The temperature profile (stability) of the atmosphere is the most critical parameter. Laser radar (lidar) techniques are discussed which are valuable to define dispersion patterns of particulate pollutants. The effects of wind and precipitation and mathematical analyses used to calculate the dispersion of pollutants are also discussed. (Author summary modified)

50098 **APTIC NO. 75056**

Lewellen, W. S., M. Teske, R. Contiliano, G. Hilst, and C. duP. Donaldson

INVARIANT MODELING OF TURBULENCE AND DIFFUSION IN THE PLANETARY BOUNDARY LAYER (INTERIM REPORT). *Aeronautical Research Associates of Princeton, Inc., Princeton, N. J., Environmental Protection Agency Contract 68-02-1310, Program Element 1AA009, ROAP 21ADO, Rept. EPA-650/4-74-035, A.R.A.P., 225, 114p., Sept. 1974. 24 refs.*

NTIS: PB 239323/AS

A computerized model of turbulence and diffusion in the planetary boundary layer is described for predicting the fate of nonchemically reacting contaminants released into the atmosphere. Reynolds stress equations are used to compute the turbulent fluctuations with invariant modeling techniques applied to close the system of equations. A basic assumption is that the dependence of third-order correlations of the velocity fluctuations on the second-order correlations, the mean flow properties, and their derivatives is invariant with respect to changes in the flow geometry. This permits data from relatively simple flow experiments to be used in evaluating the necessary coefficients in the modeled terms. The model is extended by incorporating a dynami scale equation when necessary, incorporating the capability for boundary conditions varying in either time or one dimension of space, and incorporating the capability to compute the dispersing plume and its meandering phase. Sample calculations are given for the following flow problems: the diurnal variations in the turbulence distributions in the planetary boundary layer induced by the unsteady surface heat flux; the spatial variation of turbulence occurring when the wind blows over an abrupt change in surface roughness; and the dispersal of a plume released at different heights and over different terrain under different stability conditions. (Author abstract modified)

50099 **APTIC NO. 71946**

Lombardi, D. J., R. S. Thompson, and J. E. Cermak

PHYSICAL MODELING OF THE TRANSPORT OF AUTOMOTIVE EMISSIONS IN A CITY STREET CANYON. *Preprint, Colorado State Univ., Fluid Mechanics Program, Fort Collins, 8p., 1974 (?). 6 refs.*

Measurements of tracer gas concentrations were made over a physical model of downtown Fort Collins, Colo. placed in an environmental wind tunnel. The tracer gas was released from two line sources to simulate two lanes of traffic along the main street. A thick turbulent boundary layer with neutral thermal stratification was used to simulate the atmosphere. Steady-state mean concentrations were measured in a street canyon and on the building faces forming the canyon. The concentration levels at various locations in an urban street canyon can be estimated with sufficient accuracy to reveal the effects of wind direction and street canyon geometry. This method is applicable to any passive gaseous contaminant or trace contaminant which does not settle appreciably and is dispersed as a gaseous contaminant. The location of the highest concentrations of pollutants and what the effects of buildings of different geometries will be on the pollutant concentration levels can be determined. The relationship between rooftop concentration levels and those that exist in the streets can be obtained to determine street level air quality from air-quality monitors placed on building tops. (Author conclusions modified)

50100 **APTIC NO. 72293**

Narita, O.

LOCAL CLIMATOLOGICAL STUDY ON AIR POLLUTION OVER AN URBAN AREA. *(Sapporoshi no taiki osen no kikogakuteki kaiseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):523, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 371.)*

Analysis of the measurement results of sulfur dioxide concentrations in the urban area of Sapporo revealed remarkable differences in distribution and structure of the pollution among locations in a 6 km diameter circle. The differences were attributed to differences in emission sources and climatological conditions. The difference in emission sources was the most important factor due to their closeness to the monitoring stations. Among the climatological factors, wind velocity had the most profound effect on the pollution. The factors analyzed included wind direction, wind velocity, insolation, atmospheric pressure, stability, temperature, and streamline.

50101 **APTIC NO. 71626**

Okamoto, M., S. Gatayama, T. Hashimoto, Y. Sakamoto, S. Ikuta, Y. Noda, and T. Fujii

THREE-DIMENSIONAL OBSERVATION OF PARTICULATE MATTER IN THE LOWER ATMOSPHERE BY LASER RADAR. *(Reza reda ni yoru taikichu no fuyu funjin no rittai kansoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):222, Nov. 1974. 1 ref. (Presented at the National Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 80.)*

Laser radar was used in Osaka-fu, Japan, to determine the three- dimensional distribution of space particulates (SP), and the relationship of the distributions with respect to wind (land and sea breeze). At high wind velocity (2.6 m/sec, concentration distribution becomes uniform (50 micrograms/cu m variation), within a 300-400 sq m area. At low wind velocity (0.6 m/sec), concentration variations from 150-300 micrograms/cu m were found. High SP concentrations were observed at 6:30 am at altitudes of 100 m and 250 m, and indicated the presence of temperature inversion. Concentrations ranged from 110-600 micrograms/cu m, with an average of 180 micrograms/cu m. Comparisons were also made between laser radar measurements of SP concentrations and measurements taken from a light airplane flying at altitudes of 90 m, 270 m, and 390 m. Two sets of wildly varying measurements, and six sets of good correlations were obtained.

50102 **APTIC NO. 71629**

Oya, F., S. Ochiai, N. Ishizaka, K. Iida, and Y. Fushiwaki

RELATIONS BETWEEN PHOTOCHEMICAL SMOG AND AIR POLLUTANTS. *(Kokagaku sumoggu to osen bushitsu nado no kankei--Kaifu ni yoru eikyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):581, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 430.)*

An examination of the meteorological conditions on high oxidant concentration days in Kanagawa showed that the sea-land breeze was an important factor. The wind convergence line located at Sagami Bay in the morning moves north inland with the sea-breeze, and with it the high oxidant concentration area spreads inland. On July 6, 1973, one of the high oxidant concentration days, the penetration of sea-breeze began at 12:00 noon, and the oxidant concentration peak was observed at 1:00 pm in Isegahara followed by Atsugi, Zama, and Sagamigahara. The average wind velocity was 3 m/sec, and the sea-breeze front moved at the rate of 10 km/hr, which was in agreement with the time when oxidant concentration peaks were observed in the abovementioned towns. The oxidant concentration curve was a two-peak type in most cases. As for other pollutants, however, the effect of sea-breeze on concentration peak was found to be small, and the variations in other pollutant concentrations were presumed to be local phenomena governed by regional characteristics.

50103 **APTIC NO. 72268**

Palmieri, Sabino, Francesco Nucciotti, and Gianfranco Simonini

METEOROLOGICAL FACTORS AND DISPERSION OF POLLUTANTS IN THE ATMOSPHERE: A PRELIMINARY STUDY ABOUT A LARGE POWER PLANT. *(Fattori meteorologici e diffusione di inquinanti nell atmosfera: uno studio preliminare relativo ad una grande centrale termoelettrica). Text in Italian. Riv. Meteorol. Aeronaut., 34(2):95-111, April-June, 1974.*

Meteorological observations of diurnal wind variation and atmospheric stability are presented for a location proposed as a site for a large power plant. The frequencies and diurnal time intervals of continuous fumigation are analyzed, and a classical diffusion model is used to predict points of maximum pollutant concentration. Concentration distribution maps are illustrated for the proposed power plant site.

50104 **APTIC NO. 72215**

Penzhorn, R. D., W. G. Filby, and H. Guesten

THE PHOTOCHEMICALLY INDUCED HOMOGENEOUS REMOVAL RATE OF SULFUR DIOXIDE FROM THE LOWER ATMOSPHERE OF CENTRAL EUROPE. *(Die photochemische Abbaurate des Schwefeldioxids in der unteren Atmosphaere Mitteleuropas). Text in German. Z. Naturforsch., 29(10):1449-1453, Oct. 1974. 39 refs.*

The photochemically induced homogeneous removal rate of sulfur dioxide from the lower atmosphere of central Europe was calculated on the basis of SO2 absorption band data (2900-4000 A) and measured monochromatic actinic irradiance (solar quantum flux). The maximum rate of the sunlight-induced photooxidation during the summer was 0.25%/hr. The results are compared with those obtained from experiments in simulated and real atmospheres.

50105 **APTIC NO. 71961**

Peters, Leonard K.

DEVELOPMENT OF A GLOBAL POLLUTION MODEL FOR CO, CH4, AND CH20 (FINAL REPORT). *Cleveland State Univ., Ohio, National Aeronautics and Space*

Administration Research Grant NSG 1030, NASA-CR-139484, 16p., Aug. 14, 1974. 32 refs.

NTIS: N74-31115

A global pollution model for carbon monoxide, methane, and formaldehyde is described. The numerical procedure used to mathematically describe the pollution transport is a mass conservative scheme employing an integral flux approach. The scheme is fourth-order accurate in space which is desirable in simulating convective processes in three dimensions. Similar scale mixing is described using an artificial diffusivity since computer storage places restrictions on the scale of transport processes that are explicitly calculated. The model considers the physico-chemical action of the three pollutants for the troposphere only; little transport occurs across this natural boundary. Data for sources and sinks of the pollutants are based on available information and assumptions relative to the major man-made and natural contributions. Distributions and concentrations of CH_4, CO, and CH_2O in the atmosphere are interrelated by the chemical reactions in which they participate, and a chemical kinetic model based on the pseudo-steady state approximation for the intermediate species is used to account for the reactions. The computer model is presently successfully functioning for short time integrations. Additional work is required for the development of a plotting routine and a realistic modeling parameter data tape. (Author abstract modified)

50106 **APTIC NO. 71983**

Richards, J. M.

THE DISPERSION OF AIR POLLUTION. *Loughborough Univ. of Technology (England), Leverhulme Project, Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-19. (Jan. 7-8.)*

Factors affecting the dispersion of air pollution are examined. Under light wind conditions, inversion layers are capable of trapping, storing, and subsequently releasing pollutants, thus adding to the background of pollution already present. Fumigation can occur when an inversion layer from a rural area is blown over an urban area or with the formation of thick clouds, fog, or haze which prevents heating of air near the ground. Under conditions of strong winds, gas exit velocity from a stack must be greater than 1.5 times the wind speed to prevent downwash where the plume tends to be entrained into the lee eddy behind the stack structure. The temperature of the gas stream at the orifice of the stack must be maintained at a level above the dew point of condensable material to avoid pollution problems. Topography also affects pollutants dispersion. Winds blowing at right angles to a pollution source are capable of causing a large lee eddy and turbulent flow within a region extending from the lee side of the building for a distance of 10 building heights downwind. The turbulence is restricted beneath the free stream surface which rises progressively to a height of about two building heights. Light winds are capable of producing the phenomenon of canyon eddy in urban areas where buildings are situated on both sides of the streets. Maximum pollutant concentration is inversely proportional to the square of the effective stack height. Increasing the height of the stack itself is a much more effective method of increasing effective stack height than that of increasing plume buoyancy.

50107 **APTIC NO. 69459**

Rosen, J. M., D. J. Hofmann, and Jean Laby

STRATOSPHERIC AEROSOL MEASUREMENTS II: THE WORLDWIDE DISTRIBUTION. *Wyoming Univ., Laramie, Dept. of Physics and Astronomy and Melbourne Univ. (Australia), Dept. of Physics, Office of Naval Research Contract N00014-70-A00266-0005, Rept. GM-22, 24p., Aug. 1974. 7 refs.*

Global surveys of stratospheric and upper tropospheric aersols were made using balloon-borne photoelectric particle counters. The natural variability observed at each flight station is small enough so that typical profiles were identified. Data are presented in the form of latitude cross-sections showing lines of constant aerosol mixing ratio. The stratospheric aerosol layer is clearly delineated as well as small transient layers in the troposphere and lower stratosphere. At high and low latitudes the aerosol mixing ratio profile apparently experiences a simple shift in altitude corresponding to the change in local tropopause height. (Author abstract modified)

50108 **APTIC NO. 71559**

Rossano, A. R. S. Johns, L. C. McPhillips, and D. L. Estes

AIR QUALITY IMPACT OF CHANGING PATTERNS OF TRAFFIC AND PARKING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., Pacific Northwest Section, 11p., 1974. 19 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, Nov. 19, 1974, Paper 74-AP-35.)*

A procedure for predicting carbon monoxide levels resulting from anticipated changes in parking and traffic patterns in an urban area is presented based on a mathematical air diffusion model using detailed traffic volume and emission density gradient data obtained during field measurements. Valid model results require the calibration or verification of the model by the use of actual CO monitoring data from several locations in the study area. Application of the calibrated model to predict CO concentrations at 10 different receptors in an area adjacent to a university parking facility for both the most probable and worst meteorological and traffic conditions indicated that National Ambient Air Quality Standards are not exceeded as a result of proposed revisions to the university parking and traffic regulations.

50109 **APTIC NO. 71677**

Saito, T., H. Oota, and M. Shishikura

AIR POLLUTION IN ICHIHARA (2). *(Ichihara chiku taiki osen (2) --- Okishidanto nodo to josofu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):570, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 449.)*

The relationship between high oxidant concentration in the Ichihara area (Chiba prefecture) and upper wind was analyzed based on data obtained by pilot-balloon. Generally, the altitude of the mixed layer obtained from maximum temperature and average wind velocity is used as a parameter for forecasting potential high oxidant concentration. In the case of Ichihara, however, both wind velocity and wind direction of upper wind showed complicated multiple structures. Examples of surface stream line diagrams and data on upper wind measured by pilot-balloon on Aug. 8, 1973 are given. The upper limit of the sea breeze, which is closely related to high oxidant concentration, is 200-300 m.

50110 **APTIC NO. 71834**

Sako, S., H. Nomoto, H, and K. Uchida

THE PHOTOCHEMICAL SMOG AND THE SEA BREEZE IN OSAKA. *(Osakafu ni oderu kaifu to kokagaku sumoggu no hassei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):572, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 421.)*

The relationship between high oxidant concentration and wind characteristics in Osaka was investigated. Based on data obtained during the period of May to Oct. 1973, the wind rose and average wind velocity distribution on high and low oxidant concentration days were prepared. On low oxidant concentration days, the variations in wind direction and wind velocity distribution were slight, while the change in wind direction and increase in wind velocity were observed on high oxidant concentration days indicating the definite effect of sea breeze. A typical case of high oxidant concentration related to sea breeze was shown with the example of July 4, 1974, in which the high oxidant concentration was observed immediately after the sea breeze front. The vector analysis of data on upper wind measured at 9:00 am indicated that high oxidant concentration was more likely to occur when the average wind velocity was less than 4 m/sec in the direction 0-135 degree and less than 2 m/sec in other wind directions (high oxidant concentration was observed 60 out of 83 days with the above-mentioned wind conditions). The high oxidant concentration peak time and affected area were also closely related to upper wind direction and velocity.

50111 **APTIC NO. 72102**

Shikata, H. and K. Asakura

A PLUME MODEL APPLICABLE TO UNSTABLE METEOROLOGICAL CONDITIONS. *(Kisho joken ga jikan henka suru baai no haien kakusan keisan shuho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):300, Nov. 1974. (Presented at the National Air Pollution Research Conference, Nov. 6-8, 1974, 15th, Chiba, Japan, Paper 155.)*

A smoke dispersion calculation method applicable to unstable meteorological condition was extrapolated from a plume model dispersion equation. The meteorological factors variable with time are wind direction, wind velocity, and atmospheric stability. Assuming that these meteorological factors are constant for a period of delta T, an equation for the average wind direction axis was derived. Based on the assumption that the plane perpendicular to the averate wind direction axis was the smoke dispersion direction, the dispersion equation was expanded for short period concentrations and average long period concentrations. An example of the dispersion calculation and the surface concentration distribution obtained are given.

50112 **APTIC NO. 72295**

Shimogata, S. and N. Yokoyama

SMOKE DIFFUSION MODEL FOR INTERNAL BOUNDARY LAYER OVER LAND-SEA SURFACE. *(Rinkai chitai ni okeru kemuri no kakusan moderu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):301, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 156.)*

Ground concentration was predicted for the Kashima area by using a diffusion model for the mixed layer. Effective stack height was calculated by the Moses-Carson equation, and diffusion width was obtained by measuring wind direction variation width. The Moses-Carson method was used because of better agreement between calculated and observed values. The calculation was carried out for Aug. 5, 1972 with 2.0 m/sec east wind and cloudy conditions and for Aug. 6, 1972 with 2.5 m/s east wind and sunny conditions. The model employed for the study was suitable for a sunny day with strong insolation.

50113 **APTIC NO. 69650**

Spicer, Chester W., James L. Gemma, Darrell W. Joseph, and Arthur Levy

THE FATE OF NITROGEN OXIDES IN URBAN ATMOSPHERES. *Preprint, American Chemical Society, Washington, D. C., Div. of Enivronmental Chemistry, 6p., 1974. (Presented at the American Chemical Society, National Meeting, 168th, Atlantic City, N. J., Sept. 8-13, 1974.)*

The fate of nitrgoen oxides in the atmosphere was studied in a field sampling program in St. Louis, Mo., and West Covina, Calif. The program consisted of analytical methodology development, field sampling, and data analysis. The analytical development phase involved testing of state-of-the-art techniques and in some instances development and validation of novel procedures for determining the following species during the field sampling phase of the program: nitric oxide, nitrogen dioxide, ozone, organic nitrogen compounds, ammonia, nitric acid, and particulate ammonium, nitrate, nitrite, carbon, hydrogen, and nitrogen. Temperature, relative humidity, wind speed, wind direction, and solar intensity were also monitored. Some rain fall and dust fall samples were collected and analyzed for nitrogen species. Nitric oxide, NO2, 03, and NH3 were monitored by chemiluminescence methods. Organic nitrates were determined by electron capture detection gas chromatography. A modified colorimetric procedure and a coulometric procedure were developed to measure nitric acid. The use of a carbon monoxide tracer combined with CO and NOx emission inventories were used to predict expected NOx concentrations at various points in time. The difference between the expected NOx and the measured NOx yielded the NOx which was removed from the air mass. Computer-plotted composites of the West Covina and St. Louis data are given for peroxyacetyl nitrate, HNO3, NOx, NH3, O3, NO, NO2, global irradiance, wind speed, temperature, and relative humidity.

50114 **APTIC NO. 71891**

Steinberger, E. H.

A STUDY OF THE INFLUENCE OF METEOROLOGICAL PARAMETERS ON OXIDANT CONCENTRATIONS IN JERUSALEM. *Israel J. Earth Sci., 23(1-2):19-22, 1974. 6 refs.*

Average maximum oxidant concentrations in Jerusalem for 252 summer weekdays were recorded and analyzed in relation to meteorological parameters such as temperature, pressure, relative humidity, and winds under conditions of relatively constant solar flux and vehicle density. The average maximum oxidant concentration for the 252 day period was 0.194 + or - 0.045 micrograms/l. The most important factor affecting oxidant concentration was surface pressure; oxidant concentration was a linear function of the latter. High temperatures were associated with high oxidant levels, while the opposite was true for humidity. Relatively low correlations between oxidants and humidity were at least partly due to the fact that high oxidant values were observed on a number of days when both the pressure and the humidity were high; these conditions appear to indicate the presence of low subsidence inversions over Jerusalem. Neither wind direction nor wind speed caused any significant effects on oxidant concentration, indicating that local oxidant production was far more important than horizontal advection.

50115 **APTIC NO. 71892**

Striem, H. L. and J. Tadmor

THE IMPROVEMENT IN THE CALCULATED ANNUAL WIND FREQUENCY DISTRIBUTION AT A COASTAL SITE IN ISRAEL DUE TO OBSERVATIONS IN CONSECUTIVE YEARS. *Israel J. Earth Sci., 23(1-2):23-34, 1974. 5 refs.*

Calculations of the annual wind frequency distribution (velocity and direction), which were performed in conjunction with the siting of nuclear power plants at a coastal site in Israel, tended to improve with the number of consecutive yearly observations available. Using the maximal deviation of a short- term average from a long-term average as the basis of comparison, the improvement in wind regime determination was calculated for the coastal site of Ashdod. The maximal deviation in wind direction or velocity after 1 yr of observations amounted to about 1/3 of the long-term average. Maximal deviation decreased with consecutive yearly observations as follows: 1 yr, 100%; 2 yr, 76.1%; 3 yr, 61.3%; 4 yr, 51.2%. Since the mean deviation from a long-term (12 yr) average was 43.3% of the maximal deviation, the mean of 4 yr of observations approached the practical limit of significant improvement. (Author abstract modified)

50116 **APTIC NO. 72043**

Sugawara, K. and K. Kitabayashi

WIND TUNNEL EXPERIMENT OF DIFFUSION FOR THERMALLY STRATIFIED AIRFLOW. *(Ondo seisoka* *ni okeru kakusan no fudo jikken). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):304, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 159.)*

A suction type wind tunnel 3.0 m wide, 13 m long and 1.5 m high was used to study diffusion with thermally stratified airflow and wind velocity at 0.2-10 m/sec was controlled by using an axial blower. The ground model was 1.5 m wide and 1.5 m long. Ethylene gas as tracer was released from stacks 4 cm and 6 cm high (an equivalent of 200 m and 300 m, respectively), and the analysis was carried out by total hydrocarbon analyzer. The tracer was released horizontally to the downstream where hills of 200-300 m continued. Horizontal and vertical concentration distributions were measured from 30 cm to 120 cm downstream. To obtain stable stratified airflow, a two-dimensional model 8 cm high and 3 m long, and dry ice right after, were placed 4.7 m stream from the stack. The diffusion with neutral airflow spread more in the horizontal direction than it did with stratified airflow.

50117 **APTIC NO. 71697**

Takata, T., M. Yoshioka, S. Tsujimoto, N. Oki, M. Tamaki, and Y. Torihashi

STUDY ON POLLUTION MECHANISM BY AUTOMOTIVE EXHAUST GAS. PART 2. DIFFUSION OF CO AND NOX IN THE VICINITY OF ROAD. *(Jidosha haigasu ni kiin suru osen mekanizumu ni kansuru kenkyu. Dai-2-ho. CO.NOx no doro karano gensui). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):487, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 333.)*

The diffusion of carbon monoxide and nitrogen oxides from Rt. 43 into less traveled sideroads crossing Rt. 43 at right angles was measured at Ashiya, Nishinomiya, and Amagasaki during a period from Oct. to Nov. 1973. The CO concentrations were 4.0-12.8 ppm (average 8.1 ppm) at zero m distance from Rt. 43 and 3 ppm (average) at 100 m, and the concentration ratio showed a gradual decrease with distance indicating widespread pollution by automotive exhaust gas. The NOx concentrations were 232-542 ppm (average 371 ppm) at zero m, and the concentration ratio showed a similar tendency to that of CO. The ratios of nitric oxide in NOx were 80% at zero m and 50% at 100 m. The NO/NOx ratio would probably decrease further with distance approaching 30%, since NO/NOx at windward was 30%.

50118 **APTIC NO. 71656**

Takeuchi, J. and K. Sato

RELATION BETWEEN VERTICAL METEOROLOGICAL CONDITION ON THE CHUKYO TOWER AND OXIDANT CONCENTRATION. *(Chukyo tawa ni okeru suichoku kisho jokyo to Ox nodo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):565, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 444.)*

The vertical variations in temperature, wind velocity, and wind direction were measured in Chukyo tower in Nagoya. Thermometers were placed at 5, 15, 30, 50, 70, 90, 110 and 132 m, and anemoscopes and anemometers were placed at 15, 80, and 132 m. Measurements were taken every 20 min by telemeter. The vertical distribution of wind velocity did not necessarily show logarithmic distribution, and often the wind velocity at 80 m was higher than that at 132 m. The exponent of wind velocity distribution at 15 and 80 m obtained was 0.40 (1973 average). In the region up to 132 m, temperature inversion was often observed, particularly during the summer. The stability index in the case of high oxidant concentration was negative and in the range of -0.001 to -0.0001.

50119 **APTIC NO. 71789**

Takeuchi, J., K. Koike, I. Kojima, and K. Sato

STUDY OF OXIDANT CONCENTRATION AND METEOROLOGICAL CONDITION IN AICHI DISTRICT. *(Aichi-ken ni okeru Ox konodo to kisho jokyu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):571, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 420.)*

The effect of meteorological conditions, wind in particular, were investigated by stream line analysis. In Aichi prefecture, 11 days with high oxidant concentrations were selected from the data of 1973, and the surface stream line diagram was prepared for each hour from 8 am to 6 pm on each day. A pollutant distribution diagram for the high Ox concentration period was prepared, and the relationship to wind pattern and the movement of sea breeze fronts was analyzed. Four characteristic wind patterns were associated with high Ox concentrations. Numbers of stations where Ox concentrations measured above 0.10 ppm and 0.15 ppm on the high Ox concentration days were 12-24 and 1-9 out of 33 stations, respectively.

50120 **APTIC NO. 72075**

Talavage, Joseph J. and Mark Triplett

GASP IV URBAN MODEL OF CADMIUM FLOW. *Simulation, 1974: 101-108, Oct. 1974. 5 refs.*

A computer simulation of cadmium flow in a predominantly urban ecosystem using the GASP IV urban model is described. The basic model is an aggregate continuous model which displays the time behavior of Cd levels in each of 19 compartments over a 2-year period. Since the GASP IV language is capable of combined continuous-discrete simulation, new factors such as rainfall and seasonal variations are easily incorporated into the model. The relative impact of the various types of sources was determined and some insight into control policies are provided. A continuous model was first constructed and modifications based on real world data were implemented as discrete events. The successive forms of the model proved useful for studying at least two of the characteristics of Cd flow in an urban ecosystem. (Author summary modified)

50121 **APTIC NO. 71682**

Tanigawa, T., N. Mizutani, H. Kono, and G. Ueda

DATA ANALYSIS ON PHOTOCHEMICAL OXIDANTS IN OSAKA CITY. *(Osaka- shi ni okeru kokagaku taiki osen kaiseki (II). Kokagaku taiki osen to kisho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):577, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 426.)*

Using data compiled during the period from May to Oct. in 1972 and 1973, the relationship between meteorological conditions (wind velocity, wind direction, temperature, insolation intensity, amount of precipitation, and altitude of mixed layer) and maximum oxidant concentration in Osaka was investigated. The number of days of oxidant concentration in three concentration ranges which satisfied five given conditions for wind velocity (higher than 5.0 m/sec and 5.5 m/sec), temperature, insolation intensity, and amount of precipitation or at least one given condition are tabulated. In the case of days satisfying five given conditions, the relationship between oxidant concentration and wind direction was analyzed; in five out of six cases the high oxidant concentration was associated with sea-breeze. The accumulation of oxidant from the previous day, high insolation intensity, high temperature, and low wind velocity were all contributing factors for high oxidant concentration. The relationship between maximum mixed layer and oxidant concentration was also analyzed.

50122 **APTIC NO. 72227**

Tsunoda, Y. and T. Satsutani

OBSERVATION OF ATMOSPHERIC IONS AND PHOTOCHEMICAL SMOG (II). *(Taiki ion kansoku to kokagaku sumoggu (II)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):586, Nov. 1974. 3 refs. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 436.)*

Continuous, concurrent measurements were taken on atmospheric ion concentration, wind direction, wind velocity, and local atmospheric electric potential. When photochemical smog was present, the number of small ions and extremely small ions decreased, but the number of total ions increased. At the monitoring station, changes in ions occurred about an hour before photochemical smog alert was declared.

50123 **APTIC NO. 71679**

Tsuruta, H.

THE EFFECT OF SEA AND LAND BREEZES TO THE FORMATION OF PHOTOCHEMICAL SMOG (1). *(Kairikufu no rittai kozo to kokagaku sumoggu no hassei. Sono 1). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):567, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 416.)*

The stereo-structure of wind, particularly sea and land breezes, and its role in photochemical smog formation were investigated. The upper wind was measured continuously for 65 hr from July 25 to 27, 1973 at nine points using a pilot-balloon. Simultaneously, the stereo-distribution of temperature and ozone concentration were measured using a helicopter. The south wind blowing from the Pacific coast to northern Kanto was dominant during this period. This south wind layer extended up to 1 km, which was topped by a north wind on the 25th, east wind on the 26th and south wind on the 27th. The development and diminishing of south wind was periodical. One interesting phenomenon was the penetration of a north wind with maximum altitude of 700 m between the surface wind (100 m) and the south wind in early morning hours on July 26th. The vertical east-west section of wind structure in the area (covering 25 km) is shown in a diagram. The oxidant concentration was constantly low in the Tokyo bay area where the upper wind was always southerly. After the diminishing of the north wind, the convergence area of redeveloped south wind showed high oxidant concentrations.

50124 **APTIC NO. 71541**

Vogel, J. L. and F. A. Huff

FOG EFFECTS RESULTING FROM POWER PLANT COOLING LAKES. *Preprint, American Meteorological Society, Boston, Mass., p. 374-378, 1974. 5 refs. (Presented at the Conference on Weather Modification, 4th, Ft. Lauderdale, Fla., Nov. 18-21, 1974.)*

The effects of power plant cooling lakes on weather are estimated using climatological records and Gaussian plume equations. The primary atmospheric effect of a cooling lake is the initiation and/or enhancement of fog, with the effect maximizing during the winter months. Fog initiation is greatest in the midwest portion of the country. Calculations of water vapor concentration, sensible heat, and temperature changes for distances of 0.5-1.5 km downwind of a hypothetical square-shaped cooling lake (4 sq km) resulted in temperature increases that were completely unrealistic, some being in excess of 40 C. Prominent variables that could not be closely approximated included: evaporation rate, the effect of natural convection over the pond on the stability of the air, the droplet distribution of the steam fog generated, and the temperature and humidity distributions over and downwind from the cooling lake. Available methodology for calculating downwind diffusion of fog is extremely limited.

50125 **APTIC NO. 71542**

Vogel, John L.

ANALYSES OF POSSIBLE URBAN-EFFECT THUNDERSTORMS. *Preprint, American Meteorological Society, Boston, Mass., p. 189-191, 1974. 1 ref. (Presented at the Conference on Weather Forecasting and Analysis, 5th, St. Louis, Mo., March 4-7, 1974.)*

Raidosonde and theodolite measurements were used to determine low-level flow over and around the urban St. Louis area during July and August of 1973 in studies investigating the effect of urban activity on thunderstorm formation. Two sets of low level (300-1500 m) observations indicated an area of confluence downwind of the city, suggesting the formation of the first convective activity in an area to the west and north of St. Louis. However, the first convective activity formed over east St. Louis in the general zone of confluence rather than in the maximum area of confluence. Moisture confluence, which possibly raached a maximum over East St. Louis, may have contributed to the unexpected observations. Improved forecasting of urban-related thunderstorms appears to require careful consideration of the lower levels of the atmosphere over the metropolitan area.

50126 **APTIC NO. 71840**

Wakamatsu, S.

THE EFFECT OF SEA AND LAND BREEZES TO THE FORMATION OF PHOTOCHEMICAL SMOG (2). *(Kairikufu no rittai kozo to kokagaku sumoggu no hassei Sono 2). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):568, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 417.)*

For the purpose of investigating the formation mechanism of photochemical smog, the vertical distribution of ozone concentratioa up to 1500 m at four points and horizontal distribution at 300 m were measured using a helicopter from July 17 to 19, 1973. The vertical wind distribution was also measured using a pilot-balloon. On July 17, the altitude of the sea breeze was 500-600 m, and temperature inversion layers were at 600-800 m in the morning and 400-500 m and 700-800 m in the afternoon. The vertical distribution of wind showed a convergence at 500-600 m in the morning and a divergence at 700 and 400 m and convergence at 600 m in the afternoon. The concentration peaks were at 500-700 m. The O3 distribution at the upper layer is closely related to sea breeze and vertical distribution of temperature. The high concentration region corresponded to the upper limit of the sea breeze and the stagnation region of the wind. Based on these results, the pollutants are considered to be transported to 500-700 m with the sea breeze where O3 is produced by photochemical reaction. As a result of smog formation, the insolation at ground level is reduced, thereby reducing O3 formation. Therefore, the O3 concentration peak is observed at 500-700 m. The O3 concentration decreased with increase in altitude above 1000 m.

50127 **APTIC NO. 71752**

Yamamoto, Eiichi

ON AIR POLLUTION BY SOX IN KASHIMA DISTRICT. *(Kashima chiku no SOx no kankyo nodo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):503, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 347.)*

Concentration measurements of sulfur dioxide were taken in the Kashima District, Japan, during 1972 (10 locations) and 1973 (12 locatons). Sulfur dioxide concentrations above 0.10 ppm were correlated with wind direction, wind velocity, and times of appearance. Concentrations above 0.10 ppm occurred 0.2-0.5% of the time, during the two years. occurred 0.2-0.5% of the time, during the two years.

50128 **APTIC NO. 71832**

Yutani, S.

REGIONAL DISTRIBUTION OF OXIDANTS AND METEOROLOGICAL ELEMENTS IN OSAKA-KOBE AREA. *(Hanshin chiku ni okeru okishidanto no chiiki bunpu to kisho yoso tono sokan ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):574, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 423.)*

The correlation between regional distribution of oxidant and meteorological factors in Osaka-Kobe area was investigated. Data obtained during a period from May to Sept. 1973 were used; unfortunately, many oxidant concentration measurements were missed. Therefore, estimation of oxidant concentration was attempted using data from four measuring points and linear multiple regression equations. However, the estimated values were quite different than the measured values, and therefore the idea of using estimated values for analysis was abandoned. The principal component analysis was carried out on oxidant concentration, temperature, and wind velocity (two dimensional, including wind direction), and the factor loading and factor score were calculated. The distribution of oxidant concentration in Osaka during Aug. 1973 showed that the diurnal variation in oxidant distribution is governed by two components and classified into four regional groups. A correlation was found between oxidant concentraiion distribution and wind velocity.

1973

50129 **APTIC NO. 71997**

Benninghoff, W. S., G. F. Estabrook, J. B. Harrington, H. Nichols, and A. M. Solomon

REPORT OF PALYNOLOGY GROUP. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. III, Further Model Dev., Ann Arbor, Mich., 1973, p. 84-96, 1973, AP-USIBP-H-73-4. 2 refs. (March 28-30.)*

A model of turbulent diffusion and deposition in the atmosphere is described for predicting long-range atmospheric transport of tree pollen in the Arctic. The model indicates how pollen is distributed over a period of several days north of the tree line in Canada, assuming a semi-infinite area source of pollen and using such meteorological factors as the depth of turbulent boundary layer, the mean wind speed in the turbulent boundary layer, the settling speed of the particles, and the magnitude of the vertical component of turbulence. A wind speed of about 5 m/sec and a pollen filled boundary layer depth of 1700 m yield correct estimates for pine and spruce pollen between 260 and 640 km from the forest edge. Between 130 and 260 km, the data agree only if the depth of pollen in the boundary layer is decreased by about half of its value at 640 km. The latter estimate appears unreasonable since 130 km is an adequate distance to reach a semi-steady state pollen profile within the full depth of the boundary layer.

50130 **APTIC NO. 71996**

Biswas, A. K., W. Flowers, B. Lighthart, W. E. Marlatt, P. Smith, and J. E. Thompson

REPORT OF AIR POLLUTION EFFECTS GROUP. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. III, Further Model Dev., Ann Arbor, Mich., 1973, p. 48-56, 1973, AP-USIBP-H-73-4. 3 refs. (March 28-30.)*

A mathematical model for predicting the dispersion of bacteria from a point source is described which includes a term for bacterial survival in urban air pollution. The inclusion of bacterial death rates caused by interactions of air pollutants with bacteria enables the model to preduct the number of viable bacteria downwind from a source, e.g., a sewage treatment plant. Bacterial concentrations are shown for the center line of the plume as functions of downwind distance, Pasquill s turbulence condition, sample height, source height, bacterial death rate, and mean wind speed. A computer program for the model is also presented.

50131 **APTIC NO. 71567**

Budyko, Mikhail Ivanovich

ATMOSPHERIC CARBON DIOXIDE AND CLIMATE. *(Atmosfernaya uglekislota i klimat). In: Gidrometeoizdat. Leningrad, 1973, p. 1-32. 33 refs. Translated from Russian. Linguistic Systems, Inc., Cambridge, Mass., National Aeronautics and Space Administration Contract NASW-2482, Rept. NASA TT F-15,626, 51p., Aug. 1974.*

The influence of changes in carbon dioxide concentration on the thermal regime of the atmosphere is theoretically considered, taking into account the interrelationship between air temperature and the configuration of the polar ice. Relatively small fluctuations in the amount of CO2 are capable of substantially changing climatic conditions of the planet. Fuel combustion activities over the last several decades are responsible for an estimated increasre of 0.003% in atmospheric CO2 concentration. The limits of polar glaciation are displaced by 5-10 degrees with cahnges in CO2 concentration of 0.005-00.010%, i.e., by 1/6 to 1/3 its present day content. The influence of carbon dioxide on climate is most significant in the concentration range of 0.015-0.042%; for higher and lower concentrations, its influence on the thermal regime is less significant.

50132 **APTIC NO. 67882**

Feldstein, M., M. C. MacCracken, and R. F. Reinisch

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. *California Univ., Livermore, Lawrence Livermore Lab., Atomic Energy Commission Contract W-7405-Eng-48, Bay Area Air Pollution Control District GI-36390, National Science Foundation Interagency Agreement AG-412, National Aeronautics and Space Agency Interagency Agreement AG-411, 139p., July 9, 1973. 6 refs.*

NTIS: UCID-16301

A San Francisco Bay Area Air Pollution model is being developed for use by the Bay Area Air Pollution Control District in a variety of applications ranging from the design of valid air pollution control strategies on a regional basis to realistically answering the questions of individual citizens. Some of these needs and potential applications from the viewpoint of the control agency are identified. Somme applications of the model which are presently at the fringe of the state of the art of air pollution modeling and control are briefly discussed. Four submodels are being developed including a meteorological data analysis model, a topographic data routine, a source emission submodel, and a kinetic-photochemical submodel. Information from these submodels will be introduced into one of two regional models; one model deals on a relatively fine grid with either nonreactive species or a very simplified reaction mechanism, and the other model uses a coarser grid but handles reactive species in comparative detail.

50133 **APTIC NO. 72005**

Foley, H. M. and M. A. Ruderman

STRATOSPHERIC NO PRODUCTION FROM PAST NUCLEAR EXPLOSIONS. *J. Geophys. Res., 78(21):4441-4450, July 20, 1973. 15 refs.*

The effect of past nuclear explosions on the stratospheric production of nitric oxide was determined. During certain years of intense nuclear testing, high-yield nuclear explosions injected into the stratosphere about 10 to the 34th power NO molecules. Nuclear explosions in 1961-1962 injected an amount of NO into the stratosphere which is comparable with estimates of the ambient level of NO. The residence time of the NO in the stratosphere is long compared with the time required to establish equilibrium with ozone at most stratospheric altitudes. Its vertical distribution from nuclear bursts of various magnitudes and at different latitudes is unknown, but it is certainly widely distributed in altitude, as is NO in stratospheric models. Large catalytic ozone reductions from such NO injection were not observed in worldwide total O3 measurements in the months following the explosions. (Author abstract modified)

50134 **APTIC NO. 71934**

Henderson, Thomas J. and Donald W. Duckering

METROMEX 1973: A SUMMARY OF OPERATIONS CONDUCTED BY ATMOSPHERICS INCORPORATED DURING THE PERIOD OF 7 JULY THROUGH 19 AUGUST 1973. *Atmospherics Inc., Fresno, Calif., Atomic Energy Commission Contract AT (11-1)-1199, 52p., Dec. 30, 1973.*

NTIS: COO 1199 31

A summary of tracer release, cloud measurement, and air sampling studies performed during 42 aircraft flights by Atmospherics Incorporated for the Metropolitan Meteorological Experiment (METROMEX), designed to investigate inadvertent weather modification over the St. Louis area, is presented for the period July 7 to August 19, 1973. Particulates originating from sources within and near the urban areas of St. Louis can be separately identified from general background concentrations of particles which move into and through the area from outside sources, and there seems to be a continuing increase in particulate concentrations throughout the general background surrounding the St. Louis complex, as well as the metropolitan area itself. A temperature bubble continues to be produced by the urban complex during the daylight hours, though its magnitude appears to be somewhat less than the 2.5 c maximum indicated in previous reports. Temperature, moisture, and particulates from the urban complex continue to produce a strong influence on first clouds of the day, and visual observations continue to indicate specific changes in the physical characteristics of cloud bases whenever high particulate concentrations in the larger sizes are measured within the study area. Observations of particulate concentrations and general visibility following heavy rain showers indicates that precipitation is truly a cleansing mechanism over the St. Louis area. Fragmentary evidence indicates that cloud base heights are higher over the city than over some of the rural areas. Some transport mechanism exists which moves high concentrations of particulates from low levels to altitudes reaching 13,000 ft, though the mechanism is not clearly understood.

50135 **APTIC NO. 69605**

Jessen, W. and P. Fabian

STRATOSPHERIC OZONE CALCULATIONS IN A TWO-DIMENSIONAL MODEL INCLUDING PHOTOCHEMICAL AND TRANSPORT EFFECTS. *Z. Geophys., 39(6):1023-1042, Nov. 1973. 32 refs.*

The stratospheric ozone cycle in terms of photochemistry, mean meridional circulation, large-scale eddy diffusion, and tropospheric loss processes was treated as a time-dependent problem in a two-dimensional numerical model which combined a modern wet ozone theory with dynamic effects and simple nitrogen oxides chemistry. Circulation data and eddy diffusion coefficients were taken from previous investigators. Annual variatios of total ozone were simulated to a sufficient degree of accuracy when wind components of other investigators were multiplied by the proper numerical constant. Maxima were produced in late April and mid October above the North and South Poles, respectively. Equatorial variations were very small. Vertical ozone profiles were reproduced satisfactorily only for mid-latitudes. An artificial nitrogen oxide layer induced a drastic reduction in the ozone shield. (Author summary modified)

50136 **APTIC NO. 71888**

Larson, R. E. and W. A. Hoppel

RADON 222 MEASUREMENTS BELOW 4 KM AS RELATED TO ATMOSPHERIC CONVECTION. *Pageoph, vol. 105:900-906, 1973. 8 refs.*

Radon-222 profiles were made over southwest Arizona from 300 m to 4 km altitude and related to atmospheric convection. A temperature inversion near 2 km and a stable radon concentration averaging 32.0 pc/cu m at 2 km were characteristic of morning flights. A definite pattern of high radon concentrations in the early morning and lower concentrations by noon was observed at 300 m. At 760 m the radon concentration increased between the times of ascent and descent. This pattern resulted from the trapping of radon close to the ground during stable night-time conditions and its subsequent upward dispersal with solar heating. The diurnal variation in radon concentration at higher levels was attributed to large-scale circulations rather than to local upward transport by diffusion. Above 2 km there were no conclusive differences between morning, afternoon, and evening profiles. Low concentrations of radon were measured during one late evening profile when there was no definite subsidence and advection of drier air into the region. (Author abstract modified)

50137 **APTIC NO. 72338**

Matsuzaki, Isao, Masaaki Okawachi, and Masahiro Udo

DEVELOPMENT OF AIR POLLUTION DISPERSION MODEL. *(Taiki osen kakusan moderu no kaihatsu). Text in Japanese. Kisho Gijutsu Noto (Meteorol. Study Notes), 14(1/2):107-111, Dec. 1973. 3 refs.*

The computer approach to air pollution for accurate and quick air pollution warning and the development of long term environmental pollution control plans or regional development plans is described. Himeji city with mostly fixed sources of sulfur oxides emission was selected for air pollution simulation. The input data for simulation are source data such as location of emission sources, stack height, and quantity of SOx emission and meteorological data such as wind direction, wind velocity, and atmospheric stability. The concentration at ground level was calculated by a Gaussian diffusion equation. The photographs of output on visual display of typical days with SSW, SSE, and WSW winds are given. The meteorological data, particularly the diurnal variation in wind direction and velocity by sea-land breeze, atmospheric stability and inversion layer, are important elements in the case of Himeji city. For a high pollutant concentration episode to occur, the development of sea-land breeze is a necessary condition. The meteorological data on March 18, 1972, a day of typical high pollutant concentration, were analyzed.

50138 **APTIC NO. 72200**

Rakipova, L. P. and O. N. Vishnyakova

THE INFLUENCE OF CARBONIC ACID GAS CONCENTRATIONS ON THE ATMOSPHERIC THERMAL REGIME. *(Vliyaniya variatsiy kontsentratsii uglekislogo gaza na termicheskiy rezhim atmosfery). Text in Russian. Meteorol. i Gidrol., no. 5:23-31, 1973. 13 refs.*

The influence of carbon dioxide concentration on atmospheric temperature is considered in terms of radiative heat influx, macroturbulent heat exchange (horizontal and vertical), condensation and evaporation, and heat exchange with the lower atmospheric layers and the ocean surface. Carbon dioxide concentrations were varied from zero to more than five times the modern volume concentration. The CO2 heating effect for modern conditions was 6.7 K for the warm hemisphere and 6.9 K for the cold hemisphere. A change in temperature of 0.3 K conforms to a 20% increase in CO2 concentration and a temperature change of 1.3 K conforms to a 100% increase relative to the modern volume concentration. High CO2 concentrations cause a saturation effect.

50139 **APTIC NO. 72165**

Rigot-Muller, Francois

MEASUREMENT OF THE DYNAMIC CHARACTERISTICS OF ATMOSPHERIC DIFFUSION. *(Mesure des caracteristiques dynamiques de la diffusion atmospherique). Text in French. Grenoble Univ. of Science and Medicine (France), Thesis (Ph.D.), Grenoble (France), May 8, 1973, 67p. 16 refs.*

NTIS: CEA-R-450

Theoretical study and tracer measurements of the dynamic characteristics of atmospheric diffusion are presented. The findings indicate that the atmosphere can be regarded as a linear aleatory filter whose paramaters can be determined as a function of the meteorological conditions. This diffusing filter is composed of two elementary filters that are responsible for pollutant transport as a function of wind speed and direction, and for diffusion around the mean flow as a function of the transport time and the degree of turbulence.

1972

50140 **APTIC NO. 72000**

Bell, Nancie L. and James R. Burleigh

ATMOSPHERIC DISPERSAL OF SOUTHERN CORN LEAF BLIGHT SPORES OVER THE MIDWEST IN 1971. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. II, Dev., Demonstr., Eval. Models, Boulder, Colo., 1972, p. 65-76, 1973. 1 ref. AP-USIBP-H-73-3. (July 12-14.)*

The results of an aircraft sampling program designed to study the atmospheric dispersal of southern corn leaf blight spores over the midwest in 1971 are presented. The atmospheric behavior of the genera Helminthosporium and Alternaria was compared based on counts of each collected in common samples. Although Alternaria outnumbered Helminthosporium by a factor of 10-400 at any altitude, the diverse spores showed very similar atmospheric behavior in the vertical plane under a given set of meteorological conditions, excluding humidity. The vertical movement of Helminthosporium was more greatly affected by moisture than that of Alternaria. Maximum spore numbers for each genus were detected at the 305 meter level. An examination of each spore type as a percent of the total numbers trapped at 305 m between 0900 and 2000 hr indicated nearly identical diurnal periodicities. Approximately 57-82% of Helminthosporium spores and 66-79% of Alternaria spores were trapped between the hours of 1130 and 1530. Heavy moisture reduced the numbers of airborne spores at all altitudes. (Author summary modified)

50141 **APTIC NO. 75157**

Benarie, M. M.

THE USE OF THE RELATIONSHIP BETWEEN WIND VELOCITY AND AMBIENT POLLUTANT CONCENTRATION DISTRIBUTIONS FOR THE ESTIMATION OF AVERAGE CONCENTRATIONS FROM GROSS METEOROLOGICAL DATA. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-17, 1974. 17 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

An empirical method of estimating pollutant concentrations in cases where detailed meteorological data are not available is described. The method is based on the relationship between wind velocity and ambient pollutant concentration distributions and allows estimation of average pollutant concentrations. An isoconcentration map is illustrated for 24-hour mean sulfur dioxide and nitrogen dioxide concentration data obtained at 37 points near a natural gas sweetening plant in southwest France. The map is used to predict the concentration distribution of a hypothetical location at which no receptor is located.

50142 **APTIC NO. 75155**

Gifford, Frank A.

THE FORM OF THE FREQUENCY DISTRIBUTION OF AIR POLLUTION CONCENTRATIONS. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-7, 1974. 11 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

The concentration frequency distributions of urban air pollution versus single and multiple stationary point sources of pollution are examined. Urban air pollution is fit to a long normal distribution. Although the concentration of an urban air pollutant at a given sampling point changes from one sampling interval to the next due to the variability of source and meteorological factors, at any one time it is most strongly dependent on the existing air pollution level. Meteorological factors such as wind speed and direction tend to be strongly self-correlated. Also, urban pollution is more uniform than that from isolated rural sources. In contrast to this general situation, a specific model of the frequency distribution of pollutant concentrations from an isolated point source is presented. The concentration at a given point due to a fluctuating plume of contaminant is given by a randomly positioned, spreading-disk, Gaussian plume model. The logarithm of the pollutant concentration from a single source is distributed exponentially, which is the same as a chi-square distribution with 2 deg of freedom. A normal distribution is derived for a large number of point sources of pollution.

50143 **APTIC NO. 71927**

Hage, K. D.

URBAN GROWTH EFFECTS ON LOW-TEMPERATURE FOG IN EDMONTON. *Boundary-Layer Meteorol., vol. 2:334-347, 1972. 12 refs. (Presented at the Annual Congress of the Canadian Meteorological Society, 5th, Ste Anne de Bellevue, Quebec, 1971.)*

Visibility observations at rural and urban airports in the Edmonton, Alberta area were made during the winter of 1968-1969 and compared with similar observations made in 1955 to assess the effects of increasing urban heat dissipation on low-temperature fog formation. A seven-fold increase in the total amount of water vapor added to the air by the city of Edmonton over the 1955-1969 period resulted in dense low-temperature fog formation at temperatures 5 C higher in 1969 than in 1950. Estimations of fog layer depths, temperature increases, and excess water contents in air moving along a trajectory from the southern edge of the city to the urban airport revealed that the combustion of natural gas and motor vehicle fuel can account for a major part of the urban heat island intensity near sunrise in winter and for the formation of low-temperature fog. Computed fog layer thicknesses showed a square-root dependence on heat source strength and an inverse square-root dependence on mean wind speed and on vertical temperature-gradient differences (lowest 100 m) between city and country. A fog frequency maximum associated with easterly winds and relatively high temperatures in the 1968-69 winter appeared to be due to water vapor from major industrial sources in the eastern outskirts of Edmonton.

50144 **APTIC NO. 71881**

Hoppel, W. A. and S. G. Gathman

EXPERIMENTAL DETERMINATION OF THE EDDY DIFFUSION COEFFICIENT OVER THE OPEN OCEAN FROM ATMOSPHERIC ELECTRIC MEASUREMENTS. *J. Phys. Oceanogr., 2(3):248-254, July 1972. 9 refs.*

A method for determining the eddy diffusivity over the open ocean either from profiles of the average electric field or from average values of space charge and electric field measured near the sea surface is discussed. Measurements of atmospheric electric variables and meteorological parameters off the east coast of Barbados indicate that the method of determining the eddy diffusivity and rate of evaporation by electrical measurements agrees by better than a factor of 2 with the bulk aerodynamic method. The atmospheric electric method appears to hold considerable promise under the following conditions: the absence of extraneous ionization sources, a small or well known atmospheric content of Aitken nuclei, the absence or minimization of whitecaps which are a source of positive charge, and the absence of obstructions capable of altering the natural existing electrode layer. The atmospheric electric method appears to be sensitive to local conditions and stability, whereas the bulk aerodynamic method is a gross average which depends only upon average wind speed.

50145 **APTIC NO. 75164**

Horie, Yuji and John Overton

THE EFFECT OF ROLLBACK MODELS DUE TO DISTRIBUTION OF POLLUTANT CONCENTRATIONS. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-18, 1974. 6 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

The effect of the statistical distribution of pollutant concentrations on rollback equations is analyzed using the concept of the proportional model along with several numerical examples. The form of the rollback equations, in general, changes with percentiles of pollutant concentration when incorrect growth factors are used. The growth factor may increase or decrease with percentile depending on the emission growth pattern and wind pattern. When there is no preference in wind direction and speed, growth factors tend to increase wiht percentile unless source density configuration is point symmetric and the receptor is located at the symmetric point. When there is a dominant wind direction, growth factors at downwind receptors from the emission growth center decrease with percentile and those at upwind receptors increase with percentile.

50146 **APTIC NO. 75160**

Knox, J. B. and R. I. Pollack

AN INVESTIGATION OF THE FREQUENCY DISTRIBUTIONS OF SURFACE AIR-POLLUTANT CONCENTRATIONS. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-17, 1974. 19 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

Evidence supporting the log normality of surface air pollutant concentration frequency distributions is presented. The evidence includes empirical investigative results, the relationship of meteorological variable distributions to pollutant frequency distributions from simple diffusion models, and deductions of the nature of pollutant frequency distribution from considerations of the complete set of governing equations for a multiple box model of photochemical pollutants. Practical and research implications for air quality regions having log normal pollutant distributions include: the application of air quality simulation models to land-use planning assessments or to the design of measures to achieve consistency with ambient air quality standards, the use of calculated pollutant frequency distributions that correspond to reality during the validation of air quality simulation models, simplification of data acquisition by air monitoring networks, and the establishment of feasible real-time control mechanisms. Graphical plots of carbon monoxide concentration versus frequency for various categories of pollution days are illustrated for the San Francisco area.

50147 **APTIC NO. 71998**

Marlatt, William E.

CHARACTERISTICS OF PARTICULATE CLOUDS. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. II, Dev., Demonstr., Eval. Models, Boulder, Colo., 1972, p. 31-32, 1973, AP-USIBP-H-73-3. (July 12-14.)*

Characteristics of particulate clouds are discussed, with particular reference to tropical aerosol clouds, dust domes over cities, forest fire clouds, and African dust transport. Salt particles from tropical oceans tend to form condensation nuclei, with a resultant formation of cumulus clouds. Thermal chimneys that are formed over parking lots and areas of light industry in urban areas are capable of causing a self-cleaning effect such that dust domes are broken up. This process might be put to advantage in urban planning. Although normal particulate concentrations around the top of cumulus clouds ranged from 300-4000/cu cm, concentrations of 70,000-80,000 particles/cu cm were observed at 14 km (just under the tropopause) as a result of a 7400 hectare forest fire in the Colorado Mountains. An examination of African Saharan dusts that are often carried across the Atlantic in the Northern Trade Winds revealed that no small condensation nuclei were present in the haze; particles less than 0.3 micron were undetected. The haze appears to be highly charged, with small particles being aggregated onto larger ones until the very large ones fall out.

50148 **APTIC NO. 69534**

Sarin, S. L.

AN AIR POLLUTION MODEL OF ZEELAND. *Koninklijk Nederlands Meteorologisch Inst., De Bilt (Netherlands), W.R. 72-5, 13p., 1972. 10 refs.*

NTIS: N74-27143

An air pollution model of Zeeland is presented for calculating the influence of changing source patterns. The seasonal averages of concentrations were calculated using the diffusion climatology from the meteorological station Vlissingen. Pollutant concentration patterns for three different cases are given only for winter. The physical chimney heights of the planned sources were varied in order to assess the changes in the ground-level concentrations which may assist the planners in deciding the chimney heights for the planned sources. The ground-level concentrations were also calculated for spring, summer, and autumn, but the results are not included because of the occurrence of much lower concentrations during these three seasons compared to the winter season. (Author introduction modified)

50149 **APTIC NO. 72002**

Solomon, Allen M.

PREDICTIVE MODELS OF AIRBORNE POLLEN CONCENTRATIONS: UNCERTAINTIES IN POLLEN PRODUCTION ESTIMATES. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. II, Dev., Demonstr., Eval. Models, Boulder, Colo., 1972, p. 99-116, 1973. 12 refs. AP-USIBP-H-73-3. (July 12-14.)*

Investigations dealing with the development of predictive models of airborne pollen concentration are described. Gravity-slide information, qualitatively treated, appears capable of providing valid estimates of pollen deposition. Significant relationships between pre-season meteorological factors and in-season pollen deposition suggest that pollen production is one of the parameters being measured. Such estimates are more accurate when specific-season pollinators like ragweed are used and when quantitative measures of weather-pollen relationships are provided. Nevertheless, even when data from diffuse-season pollinators are used in a qualitative fashion, a clear improvement over chance estimates results. The observa-

tion that monthly estimates based on the variables which immediately precede those months are more accurate than seasonal estimates based on pre-season variables is a function of the pollen producers involved, not of the data collected from those pollen producers. (Author conclusions modified)

50150 **APTIC NO. 75156**

Wippermann, F

METEOROLOGICAL PARAMETERS RELEVANT IN A STATISTICAL ANALYSIS OF AIR QUALITY DATA. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-8, 1974. 6 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

Meteorological parameters relevant in the statistical analysis of air quality data, assuming that the atmospheric boundary layer satisfies the conditions of a planetary boundary layer (i.e., stationarity and horizontal homogeneity), are identified. The internal parameter for thermal stratification of the boundary layer and the surface Rossby number are shown to uniquely determine pollutant concentration as long as the planetary boundary layer assumptions are satisfied. The former parameter is useful as a measure of diffusion characteristics which depend mainly on thermal stratification. Empirical dispersion categories can possibly be replaced by this parameter if the planetary boundary layer that is equivalent to the actual boundary layer can be determined. Baroclinicity of the boundary layer flow has an effect on the pollutant concentration pattern only when the pollutants are caused by highly elevated sources; the effect can be neglected in most cases.

1971

50151 **APTIC NO. 72166**

Jost, D.

DISPERSION OF AIR POLLUTANTS OVER INDUSTRIAL AREAS. *(Zur Ausbreitung von Luftbeimengungen ueber Industriegebieten). Text in German. Preprint, p. 151-156, 1971 (?). 10 refs.*

The dispersion of air pollutants over an industrial area was studied by short-time measurements of carbon dioxide tracer concentrations by means of airborne instruments under practically constant dispersion conditions. It was possible to determine CO2 concentration fields which showed the influence of single stacks with high output rate. A method is presented for the calculation of the CO2 emissions of single stacks from the measured CO2 concentration distribution with respect to the background concentration caused by smaller, lower emission sources.

1969

50152 **APTIC NO. 71671**

Krauss, Roland K. and R. M. Smith

VARIABILITY IN ATMOSPHERIC DUST SAMPLING. *Trans. Kansas Acad. Sci., 72(2):167-176, Sept. 17, 1969. 11 refs.*

The variability in atmospheric dust sampling was determined through statistical calculations of differences in quantity and aggregation of dust between sites and months using data from the dust collected at Manhattan, Kansas and Coshocton, Ohio sites. Where sites or subsites are spaced more than 1 mi apart, climatic variables precluding control are introduced. Varying wind velocities and gustiness, vegetation differences, and rainfall differences each promote differences in dust deposition. When distances range up to hundred of miles, as between Manhattan and Coshocton, then dust source area and major storm front movements are the only variables that can be used to relate the two sites. Equally important is proper placement of the collection containers with respect to human influence. Nearness to industrial activity, cultivated fields and/or livestock feeding and working operations, and to broad, flat river bottom areas influence the amount of dust collected. Strict control of analytical procedures is essential if duplicable results are to be obtained when working with small samples. (Author conclusions modified)

BASIC SCIENCE AND TECHNOLOGY

1975

50153 **APTIC NO. 71787**

Berke, Harry L. and T. E. Hull

AN IMPROVED AEROSOL GENERATOR. *Am. Ind. Hyg. Assoc. J., 36(1):43-48, Jan. 1975. 6 refs.*

An aerosol generator which automatically compensates for changes in the concentration and volume of a solution during aerosolization by adjustment of the temperature and pressure of the atomizing air jet is described. The device consists of two Lucite tubes set in a Lucite base with a communicating port between them. The communicating port is so located that the solution drains from one tube (an air-tight reservoir tube) into the other (the generating tube) by air displacement when aerosolization causes the liquid volume to fall below the opening between them. Isolation of the reservoir and generating tubes by a set of baffles prevents air bubbles from entering the reservoir chamber and interfering with the gravity flow of solution into the generating tube. The aerosol generator is particularly useful for the investigation of deposition-retention characteristics in animal lung. Rare earth aerosols with mass median diameters as low as 0.075 can be reliably generated.

50154 **APTIC NO. 72264**

Bickelhaupt, Roy E.

SURFACE RESISTIVITY AND THE CHEMICAL COMPOSITION OF FLY ASH. *J. Air Pollution Control Assoc., 25(2):148-152, Feb. 1975. 10 refs.*

The relationship between surface resistivity and the chemical composition of fly ash was determined. Resistivity was determined for a group of well characterized ashes representing both eastern and western coals. Data were taken between 60 and 250 C in an environment of air containing approximately 9 vol% water. Chemical transference experiments were conducted for two ashes having substantially different chemical compositions. Chemical analyses of the transference specimens revealed a pronounced migration of alkali metal ions toward the negative electrode. The surface resistivity was inversely proportional to the concentration of these ions. The iron concentration influenced particularly the participation of potassium. Surface resistivity is sensitive to the chemical composition of fly ash because the alkali metals serve as charge carriers. The conduction mechanism is probably analogous to that of glass. (Author abstract modified)

50155 **APTIC NO. 71619**

Conte, Corrado, Giuseppe Devitofrancesco, and Bianca Maria Petronio

THE INFLUENCE OF ATMOSPHERIC AEROSOLS ON PHOTOCHEMICAL REACTIONS. *(Der Einfluss von atmosphaerischen Schwebstoffen auf photochemische Reaktionen). Text in German. Staub, Reinhaltung Luft, 35(2):51-53, 1975. 9 refs.*

Photochemical reactions which occur in the atmosphere between hydrocarbons and nitrogen oxides were simulated in a 61-glass flask. For the experiments atmospheric dust collected in Rome and Milan was kept constantly in motion. Ultraviolet radiation of wavelength 3660 A and intensity 3750 microwatt/sq cm was produced by a black-ray B-100A lamp.

After UV irradiation, analyses were performed by infrared spectrophotometry and gas-chromatography. Through IR analysis the presence of some functional groups such as CO and CHO, as well as of some other products such as acetone and formaldehyde was confirmed. In addition, absorption bands of nitrogen-containing compounds (peroxyacyl nitrates) were found. Through gas chromatography, various nitro-compounds were determined and their quantitative changes followed. The dust particles physically adsorbed various substances and there was formation of new products on their surface. Production of hydroxyl radicals was higher in the presence of dust particles.

50156 **APTIC NO. 72089**

Doyle, George J., Alan C. Lloyd, K. R. Darnall, Arthur M. Winer, and James N. Pitts, Jr.

GAS PHASE KINETIC STUDY OF RELATIVE RATES OF REACTION OF SELECTED AROMATIC COMPOUNDS WITH HYDROXYL RADICALS IN AN ENVIRONMENTAL CHAMBER. *Environ. Sci. Technol., 9(3):237-241, March 1975. 54 refs.*

The relative rates of the disappearance of eight aromatic hydrocarbon compounds in air under simulated atmospheric conditions of temperature, pressure, concentrations, light intensity, and other trace contaminants (nitrogen oxides, carbon monoxide, hydrocarbons, and water) were measured in a 6000-liter environmental chamber. The hydroxy radical appears to be the specie largely responsible for the chemical transformation of the aromatics as well as that of other relatively unreactive hydrocarbons such as normal butane. Using the published rate constants for the reaction between hydroxy radical and normal butane, rate constants are calculated for the reaction of hydroxy radical with toluene, para-, meta-, and ortho-xylene, 1,2,3-, 1,2,4-, and 1,3,5-trimethylbenzene with values (at 304 K) ranging from 2.5 + or - 0.9 times 10 to the 9 l/mol sec for toluene to 3.1 + or - 0.4 times 10 to the 10 l/mol sec for 1,3,5- trimethylbenzene. An upper limit of 2.3 times 10 to the 9 l/mol sec is calculated for benzene. The rate constants for the reaction of hydroxy radical with meta-xylene and the trimethylbenzenes are at least as large as that for propylene, confirming that substituted aromatics may play a significant role in atmospheric chemistry. (Author abstract modified)

50157 **APTIC NO. 71785**

England, Christopher and William H. Corcoran

THE RATE AND MECHANISM OF THE AIR OXIDATION OF PARTS-PER-MILLION CONCENTRATIONS OF NITRIC OXIDE IN THE PRESENCE OF WATER VAPOR. *Ind. Eng. Chem., Fundamentals, 14(1):55-63, 1975. 34 refs.*

The kinetics of the oxidation of nitric oxide in the presence of water were studied over the temperature range of 25-50 C. Three principle reactions appeared to occur: the reaction of nitric oxide with molecular oxygen to give nitrogen dioxide, the reaction of NO plus NO2 plus water to give NO and nitric acid vapor, and the reaction of HNO2 with water to give NO and nitric acid vapor. Water vapor showed no specific catalytic effect in the gas phase in the presence of a glass surface but did show a major effect with a Carbowax surface. The adsorption of large quantities of water on the glass reactor surface increased the oxidation rate slightly, though the effect was eliminated by raising the reaction temperature to 40 C. At this temperature and above, the oxidation of NO, as measured by the rate of formation of NO2, appeared to decrease in rate. It was assumed that the rate of oxidation of NO by O2 was unchanged and that HNO2 vapor was formed by the overall reaction of NO plus NO2 plus water. The differences in oxidation rate observed with Carbowax versus glass catalyst surfaces illustrated the importance of controlling reaction conditions in such studies.

50158 **APTIC NO. 71942**

Hidy, George M., Bruce R. Appel, Robert J. Charlson, William E. Clark, Sheldon K. Friedlander, Dale H. Hutchison, Theodore B. Smith, J. Suder, Jerome J. Wesolowski, Kenneth T. Whitby, and Peter K. Mueller

SUMMARY OF THE CALIFORNIA AEROSOL CHARACTERIZATION EXPERIMENT. *Preprint, 36p., 1975. 13 refs.*

The experimental plan and the early results of field observations from the California Aerosol Characterization Experiment are summarized. The program centered on questions of the sources and evolution of aerosols in urban air as they are super-imposed on a natural background, particularly as they relate to visibility degradation. Field observations were made from July- Nov. 1972 in several urban and non-urban locations and aerosols accompanying photochemical smog were studied intensively in the Los Angeles Basin during July-Oct. 1973. The observations include physical and chemical properties of aerosols, pollutant gas concentrations, and meteorological variables. Sulfate, nitrate, non-carbonate carbon, and liquid water were of great importance to the mass concentrations of airborne particles and their relation to reduction in visibility. The anthropogenic contribution to atmospheric aerosols is primarily allocated to the submicron size range. (Author abstract modified)

50159 **APTIC NO. 75093**

Spence, John W., Fred S. Stump, Fred H. Haynie, and James B. Upham

ENVIRONMENTAL EXPOSURE SYSTEM FOR STUDYING AIR POLLUTION DAMAGE TO MATERIALS (FINAL REPORT). *Environmental Protection Agency, Research Triangle Park, N. C., Office of Research and Development, Rept. EPA-650/3-75-001, 45p., Jan. 1975. 2 refs.*

NTIS: PB 240615/AS

A five-chamber, controlled-environment exposure system that provides simulated environments for conducting statistical experiments designed to determine pollutant-induced material deterioration is described. The system s design features include independent controls for regulating temperature, relative humidity, and the concentration of gaseous sulfur dioxide, nitrogen dioxide, and ozone. An accelerated weathering system that includes a variable dew/light cycle is also provided. Chill racks are used to produce dew, and xenon lamps are used to simulate sunlight. Prior to initiation of exposure studies, differences in lighting and pollutant distribution among the chambers are minimized to below 10% variation for 95% of the measurements. (Author abstract modified)

1974

50160 **APTIC NO. 71603**

Aksel-Rubinshteyn, V. Z. and L. A. Tiunov

PREDICTION OF THE TOXIC EFFECT OF INTERACTING CHEMICAL COMPOUNDS IN THE AIR. *(O prognozirovanii toksicheskogo effekta pri vzaimodeystvii khimicheskikh veshchestv v vozdukhe). Text in Russian. Gigiena i Sanit., no. 9:85-87, 1974. 3 refs.*

Problems in predicting the toxic effect of interacting chemical compounds in the air were investigated by a theoretical model study. The hygienic significance of chemical reactions taking place between two different air pollutants is determined mainly by the rate, rather than the nature, of the reaction; the rate of air exchange is also an important factor. The model study on first-order reactions between a toxic and a non-toxic compound which yield a secondary mixture with a lower or higher toxicity than that of the primary toxic component revealed that even slow chemical reactions are hygienically significant if the toxicity of the secondary mixture is at least 2 to 3 times that of the initial mixture. The conversion rate in first-order reactions is independent of the concentrations of the components, i.e., acute and chronic poisoning tests on such interactions are comparable. In second-order reactions, exemplified by that of nitric oxide with oxygen to form nitrogen dioxide, the interaction is a function of the concentrations of the components, as there is no interaction if one of the components is present at a low concentration.

50161 **APTIC NO. 75276**

Aliyev, G. M. A. and A. Y. Gonik

TSIKLONOM-1 INSTRUMENT FOR MEASUREMENT OF DUST RESISTIVITY. *(Pribor Tsiklonom-1 dlya izmereniya udel nogo elektricheskogo soprotivleniya pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-5, Sept. 1974. Translated from Russian, 5p. (Also: Peredovoy Nauchno-Tekhnicheskiy i Proizvodstvennyy Opyt State Scientific Research Institute for Scientific and Technical Information (USSR) Rept. 4p., 1968.) (Entire report of TR 104-75 processed under APTIC 70040.)*

A method for the in situ measurement of dust resistivity in flue gases is described. Dust laden gas enters a cyclone through an intake tube. Following separation of the two components and discharge of the gas through an exhaust tube, the dust flows down into a hopper and occupies a space between two electrodes attached to the measuring system. The entire unit is fastened into the flue by means of three hollow metal dowels. The efficiency and hydraulic resistance of the instrument are optimum at a gas flow rate of 15-25 l/min. Field test results are presented for dusts from calcining rotary kilns and for boiler fly ash.

50162 **APTIC NO. 75284**

Andrianov. Y. I., A. D. Zimon, and S. S. Yankovskiy

DEVICE FOR DETERMINATION OF STICKINESS OF FINELY DISPERSED MATERIALS. *(Ustroystvo dlya opredeleniya slipayemosti tonkodispersnykh materialov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 18-20, Sept. 1974. 2 refs. Translated from Russian, 3p. (Also: Zavodsk. Lab. (Moscow) no. 3:375-376, 1972.) (Entire report of TR 104-75 processed under APTIC 70040.)*

A device for determining the stickiness of a dispersed powder is described. The powder being studied is placed inside a hollow cylinder and is then compacted into a layer. The layer is then is then subjected to a breaking force which is measured. The compression and breaking loads are directed in a single direction such that the stickiness of the dispersed material can be related to the strength of the layer formed from it.

50163 **APTIC NO. 71544**

Bullrich, K., K. Fischer, and G. Haenel

RESEARCH ON ATMOSPHERIC OPTICAL RADIATION TRANSMISSION. *Johannes-Gutenberg Univ., Mainz (West Germany), Meteorological Inst., Air Force Grant AFOSR73-2545, Proj. 7621-03-01, Program Element 62101F, Subelement 687621, Rept. AFCRL-TR-74-0273, 20p., April, 1974. 21 refs.*

NTIS, DDC: AD 781842

Measurements of the mass absorption index of urban and nonurban aerosols in the infrared wavelength are discussed in connection with aerosol modeling. Jet impactor samples of aerosols from polluted and nonpolluted areas are collected and characterized by band patterns of various ions. The main chemical constituent of urban aerosols is diammonium sulfate. Numerous superimposing bands of organic carbon compounds like soot are responsible for a marked intense background absorption observed for urban aerosols. Absorption of marine aerosol is determined by salts such as sodium chloride and potassium chloride predominantly. Aerosol absorption in the short wavelength range produces heating. The absorption depends on the relative humidity and climatic conditions. Relationships between the chemical composition and morphology of aerosol particles and their water uptake at large relative humidities allow for the treatment of problems concerning cloud physics and electromagnetic wave propagation in clouds and fog.

50164 **APTIC NO. 71941**

Cheng, Y. S. and C. S. Wang

A SIMPLE MODEL OF PHOTOCHEMICAL SMOG REACTIONS. *Preprint, American Inst. of Chemical Engineers, New York, 18p., 1974. 7 refs. (Presented at the American Institute of Chemical Engineers Annual Meeting, 67th, Washington, D. C., Dec. 1974, Paper 23 e.)*

A simple kinetic scheme, adapted from the Hecht-Seinfeld model for the photochemical smog reactions, is analyzed. The simple model, which consists of eight reactions, is reduced to a system of three ordinary differential equations by pseudo-steady state assumptions. Analytical solutions are derived for the pollutant concentrations in terms of a dimensionless reaction time. The results predicted from the model are in good agreement with the smog chamber data except for the curves for ozone. This indicates the model is incomplete. The model does not include the reactions of O_3 with nitrogen dioxide or reactions involving water and carbon monoxide. (Author abstract modified)

50165 **APTIC NO. 72247**

Chisaka, Fumitake, Shigeru Yanagihara, and Isamu Shimada

ANALYSIS OF PHOTOCHEMICAL POLLUTANTS IN SMOG CHAMBER EXPERIMENTS. *(Sumogu chanba hikken ni okeru hanno seiseibutsu no bunseki ni tsuite). Text in Japanese. Kikai Gijutsu Kenkyusho Shoho (J. Mech. Eng. Lab.), 28(6):213-223, Nov. 1974. 4 refs.*

Smog chamber experiments were performed to investigate the efficiency of various analytical methods for the determination of photochemical pollutants. Optical analysis provided excellent response characteristics for ozone and nitric oxide, while gas chromatography allowed for the determination of instantaneous values of peroxyacyl nitrates as well as various saturated and olefinic hydrocarbons in the system. Reaction rates for the above species were also obtained.

50166 **APTIC NO. 71523**

Chylek, Petr and J. A. Coakley, Jr.

ANALYTICAL ANALYSIS OF A BUDYKO-TYPE CLIMATE MODEL. *Preprint, New York State Univ., Albany, Dept. of Atmospheric Science and National Center for Atmospheric Research, Boulder, Colo., 18p., Aug. 1974. 4 refs.*

A mathematical analysis of the Budyko-type climate model is presented to demonstrate that the model does not predict a complete glaciation of the earth with a small decrease in the solar constant as previously claimed. The results of the Budyko model suggest that with a decrease in the solar constant of about 1.6%, the ice cap reaches a latitude of about 50 degrees. At this point the model breaks down and does not predict further progress of the ice sheet toward the equator. (Author abstract modified)

50167 **APTIC NO. 75071**

Cox, James L., Jr.

A STUDY OF STRATOSPHERIC GASES CATALYTICALLY REACTING ON ALUMINA (FINAL TECHNICAL REPORT). *Old Dominion Univ. Research Foundation, Norfolk, Va., National Aeronautics and Space Ad-*

ministration Research Grant NGR 47-003-077, 7p., Aug. 1974. 3 refs.

NTIS: N74-30840

An experimental system for exposing alumina which has been thoroughly cleaned in ultrahigh vacuum to gases such as hydrogen chloride, sulfur dioxide, and ozone that are capable of catalytically reacting in the stratosphere with solid particles of rocket engine exhaust is described. The system is divided into a main vacuum chamber and a fore-line assembly. The main vacuum chamber is pumped by a 60 l/sec noble ion pump and by a titanium sublimation pump with a pumping speed of approximately 100 l/sec. A cross-shaped part of the chamber immediately above the sublimation pump is the target or experimental area where a sample of material such as alumina can be mounted for study. The sample is mounted from a target flange, and a mass spectrometer is connected to the flange opposite the target flange. Two sapphire windows located on an axis perpendicular to the sample-analyzer axis allow observation and irradiation of the sample. A ruby laser (pulse mode) is mounted for firing through the windows. A two-branch fore-line assembly is used to evacuate the system from atmospheric pressure to pressures of about 10 to the -7 torr. It is also used during the initial stages of system bake-out and for cleaning the gas inlet from a gas supply cylinder to the meter valve on the main chamber.

50168 **APTIC NO. 71939**

Dimitriades, B.

CHEMICAL BASIS FOR CONTROL STRATEGIES: CURRENT OXIDANT PROBLEM. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 12p., Dec. 18, 1974.*

Methods used by the Environmental Protection Agency to obtain quantitative relationships between oxidants and controllable oxidant precursors (hydrocarbons and nitrogen oxides) are reviewed in terms of the formulation of an oxidant control strategy. Aerometric data analysis was used to develop current oxidant control strategy by deriving an empirical relationship between maximum 1-hour oxidant (ozone) concentration and the 6-9 am nonmethane hydrocarbon concentration at the same monitoring station. A curve was then derived to relate oxidant concentration for a region with the percentage of hydrocarbon control required in order to achieve the oxidant standard. Smog chamber data are being used to derive oxidant isopleths that depict the dependence of oxidants on hydrocarbons and NOx. The applicability of these smog chamber relationships to the real atmosphere, however, are limited at present. Mathematical models containing a dispersion component and a photochemical component are currently being developed to define oxidants as a function of every conceivable condition that affects oxidant formation. More research is required before models can be applied to develop control strategies.

50169 **APTIC NO. 75072**

Dimmick, R. L., H. Wolochow, M. A. Chatigny, P. A. Straat, J. R. Schrot, and G. V. Levin

EVIDENCE FOR METABOLIC ACTIVITY OF AIRBORNE BACTERIA (QUARTERLY REPORT). *California Univ., Berkeley, Naval Biomedical Research Lab., National Aeronautics and Space Administration Contract W13450, Task 193-58-61-13-10, 9p., 1974. 10 refs.*

NTIS: N74-31552

Studies of the metabolic activity of bacterial aerosols were performed to investigate the probability of the growth of spacecraft-borne terrestrial microorganisms in gaseous clouds containing methane, ammonia, and water during probes of Jupiter and Saturn. Aerosols of the bacterium Serratia marcescens and of carbon-14-labeled glucose were created simultaneously and mixed in tubing leading to an aerosol chamber. Radiolabeled carbon dioxide was produced unequivocally within the chamber during a subsequent period of about 5 hr. The amount of labeled CO2 gradually increased until a plateau was reached and then decreased subsequently. Omission of the bacterium from the drum resulted in the production of less than 15% of the CO2 accumulated in the presence of the bacterium during the entire run, indicating that most of the COS observed in the presence of the bacterium and glucose was metabolic in origin. Thus metabolism can and does occur in the aerosol state.

50170 **APTIC NO. 71802**

Fujitani, Y., F. Matsunari, and M. Suzuki

DATA PROCESSING SYSTEM WITH COMPUTER. *(Densanki ni yoru deta shori shisutemu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):548, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 397.)*

An improved computer data processing system is described for analysis of measurements taken on 7 atmospheric pollutants, 6 meteorological factors, and one set of traffic conditions. The computer used was NEAC 2200/500 (Nihon Electric Co.). A schematic diagram is included.

50171 **APTIC NO. 72091**

Graedel, T. E. and J. P. Franey

ATMOSPHERIC AEROSOL SIZE SPECTRA: RAPID CONCENTRATION FLUCTUATIONS AND BIMODALITY. *J. Geophys. Res., 79(36):5643-5645, Dec. 20, 1974. 16 refs.*

High-speed detection of bimodality variations in ambient aerosol size versus number distributions was performed over the size range of 0.29-4.94 micron. Determination of size spectral characteristics at 10.8-second time intervals revealed concentration variations of as much as a factory of two in adjacent air parcels, suggesting that rapid spectral changes of aerosols are due to variations in the relative strengths of two distinct physical generation mechanisms for the atmospheric aerosol. (Author abstract modified)

50172 **APTIC NO. 68197**

Hadeishi, Tetsuo

ISOTOPE SHIFT ZEEMAN TECHNIQUE FOR DETECTION OF ATOMS AND MOLECULES. *Preprint, California Univ., Berkeley, Lawrence Radiation Lab., 15p., 1974 (?). 3 refs.*

The use of isotope shift Zeeman effect atomic absorption spectrometry (IZAA) for the detection of atoms and molecules in various plant and animal materials is described. The technique is capable of detection of atomic elements directly from the host material without prior chemical treatment, with typical measurement times ranging from 15-60 sec. The IZAA technique in its present form is capable of detecting mercury, lead, cadmium, and arsenic atoms as well as sulfur dioxide, carbon monoxide, and carbon dioxide molecules. The capability of the instrument is illustrated for the detection of mercury in human hair, urine, soil, and fish meat; comparisons between the IZAA method and other conventional methods are also presented for mercury analyses of such materials and show the matrix independence of the IZAA method.

50173 **APTIC NO. 71805**

Hasegawa, K., F. Miyamoto, M. Funabashi, M. Shioya, and Y. Shigeki

ON-LINE SYSTEM FOR AIR POLLUTION MONITORING AND PREDICTION. *(On-rain taiki osen kanshi yosoku shisutemu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):549, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 398.)*

The computerized air pollution monitoring and prediction system in satisfactory use from April 1973 in Hyogo Prefecture, Japan, is described. A single large computer is used for information storage and retrieval to provide a system with high cost performance. Schematic diagrams of the system are included.

50174 **APTIC NO. 72026**

Hiraoka, M., Y. Ikeda, and M. Sasakura

ADAPTATION OF CONVECTION AND DISPERSION IN WATER TO AIR POLLUTION PHENOMENA. *(Suiryu jikken ni yoru tairyu kakusan no taiki osen gensho eno tekiyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):308, Nov. 1974 (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 163.)*

Convection and dispersion in water were studied at forced convection and at (1) stable condition with countercurrent cooling water on the entire plate, (2) neutral condition, (3) unstable condition with countercurrent warm water on the entire plate, (4) existence of a heated island, or (5) existence of a cooled island. Methylene blue at 50 mg/l was used as tracer and the concentration distribution was determined by colorimetric method. Temperature distribution was determined by thermistor, and flow rate and flow stream distributions were measured by using a hydrogen gas generator. Results showed that flow rate in the region 10 cm from the bottom followed exponential distribution, and the magnitude of the exponent decreased from condition (1) to (3). Diffusion coefficients at 10-20 cm downflow distance at conditions (1), (2) and (3) were determined, and the difference in concentration distribution between condition (4) and condition (5) were examined.

50175 **APTIC NO. 71806**

Hiraoka, T., T. Masuda, T. Nakano, K. Nishiyama, S. Kojima, T. Ohse, M. Fujii, and H. Hata

DATA BANK SYSTEM FOR POLLUTION. *(Kogai deta banku). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):552, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 401.)*

An air pollution data bank system was formulated for the TOSBAC-5600 large-size computer. The system can be adapted to other pollution data. Schematic diagrams are included.

50176 **APTIC NO. 72339**

Hortig, H. P.

STUDY OF THE TRANSPORT OF AEROSOLS IN CLEAN ROOMS. *(Unterschungen ueber den Transport von Aerosolen in Reinraum- Anlagen). Text in German. Dechema Monograph., 75(1452-1485): 229-239, 1974. 5 refs.*

The propagation of aerosol particles behind sources of contamination, e.g., leaks in filters or sites of activity releasing aerosol particles in laminar-flow clean rooms was studied theoretically and by practical measurements behind a filter with a 0.6 mm leak. The filter used in the laminar flow chamber had a retention efficiency of 99.998%. While the effect of gravity on aerosol particles is negligible, they are affected by entrainment forces and diffusion. The particle concentration in the axis of the leak was nearly equalized at 10 cm distance from the leak site due to transversal migration, which indicates the effect of turbulent rather than of molecular diffusion. The process of propagation can be described in the form of a diffusion problem if a coefficient is introduced for the turbulent diffusion. The term laminar flow is not proper because laminar flow constitutes in reality a low-turbulent flow with a turbulent grade of about 10%, and therefore should be replaced by the term low-turbulent displacement current.

50177 **APTIC NO. 71614**

Hulanicki, Slawomir

TEMPERATURE STUDIES CONCERNING DUST/AIR MIXTURES FOR DETERMINATION OF THE MAXIMUM OUT-OF-DANGER TEMPERATURE. *(Temperaturuntersuchungen an Staub-Luft-Gemischen zur Ermittlung der maximalen gefahrlosen Temperatur). Text in German. Staub, Reinhaltung Luft, 34(11):392-395, Nov. 1974. 4 refs.*

The dependence of the self-ignition temperature of a dust/air mixture on the induction period of self-ignition was examined by an apparatus especially developed for the purpose. It consisted of a compressor which presses the air through a rotameter into the igniter equipped with an electromagnetic aerosol distributor and a photo cell. Knowledge of the relationship between self-ignition temperature and the induction period of self ignition permits determination of the boundary temperature of self-ignition. This temperature is called the maximum out-of-danger temperature. Self-ignition of dust/air mixtures takes place according to three mechanisms. In the range below 800 K the diffusion velocity is the determining factor and in the range above 1000 K the reaction kinetics of the reaction partners determine the combustion and self-ignition speed. In the transitional range both mechanisms take place simultaneously.

50178 **APTIC NO. 67992**

Jaffe, S. and E. Wan

THERMAL AND PHOTOCHEMICAL REACTIONS OF NO2 WITH BUTYRALDEHYDE IN GAS PHASE. *Environ. Sci. Technol., 8(12):1024-1025, Nov. 1974. 22 refs.*

The rates of thermal and photochemical reactions of butyraldehyde with nitrogen dioxide were measured. A least squares treatment of the data yielded a thermal rate constant of 10 to the 7.4 times base e to the minus 12,400/(molar gas constant times absolute temperature), where the rate constant was expressed per liter-mol sec. The rate constant for the reaction of oxygen atoms with butyraldehyde was 1.5 times 10 to the 8/liter-mole sec at 25 C. The results were close to those for lower molecular weight aldehydes and indicated that all the aldehydes up to butyraldehyde may be treated by means of one general mechanism, involving dependency on the aldehydic C-H bond energy. (Author abstract modified)

50179 **APTIC NO. 75275**

Kizim, I. A. and I. K. Reshidov

INSTRUMENT FOR MEASUREMENT OF RESISTIVITY OF DUST UNDER INDUSTRIAL CONDITIONS. *(Pribor dlya izmereniya udel nogo elektricheskogo soprotivleniya pyli v promyshlennykh usloviyakh). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-12, Sept 1974. 3 refs. Translated from Russian, 12p. (Entire report of TR 104-75 processed under APTIC 70040.)*

An instrument for the measurement of dust resistivity under industrial conditions is described along with some laboratory and field test results. The principle of operation consists of measuring the resistance of a dust layer of a given thickness that is formed in a conrona discharge field. Constancy of thickness of the layer is ensured by precipitation of the dust on a comb-type precipitating electrode. Two such electrodes, located in a single plane, form a comb-shaped gap that is filled with dust by means of an electrical filed created by the corona discharge electrodes. The resistance measurements are performed with an ohmmeter or any other suitable device. Laboratory testing indicated that best results are obtained when the gas flow is directed perpendicular to the planes of the comb-shaped electrodes. Field tests conducted on an electrostatic precipitator collecting fly ash from a 150 MW coal-fired power station unit indicated satisfactory performance of the unit.

50180 **APTIC NO. 71800**

Kumazawa, Y. and T. Nakajima

CALCULATION OF COMPOSITE ATMOSPHERIC POLLUTION INDEX FOR OSAKA. *(Osaka ni okeru fukugo taiki osen shihyo no shisan). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):546, Nov. 1974. 3 refs. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 395.)*

Pollution data for Osaka Prefecture, Japan, were used to calculate P index values. These values were compared to P index values calculated by R. Babcock for various regions in the United States. Further refinement is necessary before meaningful calculations applicable to conditions in Japan can be developed.

50181 **APTIC NO. 72062**

Luria, Menachem, Kenneth J. Olszyna, Rosa G. de Pena, and Julian Heicklen

KINETICS OF PARTICLE GROWTH - V: PARTICLE FORMATION IN THE PHOTOLYSIS OF SO_2-ALLENE MIXTURES. *J. Aerosol Sci., 5(5):435-447, 1974. 3 refs.*

The kinetics of particle formation during the photolysis of sulfur dioxide (over 3000 A) in the presence of allene (C_3H_4) at 29 C was studied. The reaction products were carbon monoxide, ethylene, and an oil containing five carbons, eight hydrogens, one sulfur, and one oxygen atom. The rate of CO production was proportional to the pressure and was nearly independent of the allene pressure. However, the ratio of $(C_2H_4)/(CO)$ varied from 0.15-0.23 as the $(SO_2)/(C_3H_4)$ ratio varied from 5.8 to 1.0-0.14. Nucleation occurred suddenly after an initial period during which only CO and C_2H_4 were produced. Particle production occurred for a short time and then ceased. The particles grew rapidly by condensation of the oil molecule which was continuously produced throughout the irradiation. Thus the particles maintained a fairly uniform size. The maximum particle density occurred when the particles had grown to about 72 A in diameter, corresponding to a condensation rate coefficient of 7.0 times 10 to the minus 7 cc/min. After the maximum was reached, the particle density dropped slowly because of coagulation which proceeded on every collision (corresponding to a rate coefficient of about 10 to the minus 7 cc/min). Diffusional loss of particles to the wall was negligible. In addition to removal by condensation, the C_5H_8SO oil molecule was also lost by diffusion to the wall with a rate coefficient of 0.30/min. A simple reaction scheme was developed to represent particle nucleation. (Author abstract modified)

50182 **APTIC NO. 71645**

Shigeta, A., A. Endo, I. Maeda, and W. Kawai

STUDIES ON MEASUREMENTS OF NITRILES AND VINYL CHLORIDE. *(Nitoriru rui oyobi enka biniru monoma no sokutetho ni kansuru mento). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2): 441, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 292.)*

A mixture of acrylonitrile, acetonitrile, and vinyl chloride (10 ppm) in N_2 was sealed in clean borosilicate glass tubes and syringes and the concentration change was measured by gas chromatography (flame ionization detector) to determine the adsorbing effect in the containers. The analytical conditions were as follows: nitriles: 3 m by 3 mm column packed with 25% 1,2,3-TCEP + Shimalite (AW-DMCS), carrier gas N_2 at 50 ml/min; vinyl chloride: 4 m by 3 mm column packed with 20% TCP + Shimalite W, carrier gas N_2 at 50 ml/min. Acrylonitrile, acetonitrile, and vinyl chloride concentrations in syringes decreased significantly with increasing time whereas those in the glass tubes remained unchanged. Moisture has no apparent effect on the concentration change of the nitriles.

50183 **APTIC NO. 69863**

Takahashi, Kanji, Mikio Kasahara, and Masayuki Ito

PHOTOCHEMICAL AEROSOL FORMATION IN ATMOSPHERIC AIR. *(Taiki no kokagakuteki ryushi seiseino ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):170, Nov. 1974. (Presented at the 15th National Air Pollution Research Conference, Chiba, Japan, Nov. 6-8, 1974, Paper 23.)*

A smog chamber experiment is performed to predict the pollutant concentration capable of forming aerosol particles. The number of particles formed per volume, N, is measured by changing several variables, such as irradiation time, temperature, and artificial at solar ultraviolet light. The N decreased with the intensity of UV light; therefore, the larger N would be expected during night. Upon irradiation with UV light, the particles formed were between 0.005 to 0.02 micron. However, most of the particles were in the vicinity of 0.0075 micron.

50184 **APTIC NO. 72116**

Terabe, M., T. Murase, Y. Iwase, T. Ogura, and Y. Furukawa

MEASUREMENT OF SUSPENDED PARTICULATES FOR ENVIRONMENTAL STANDARD, PART II. *(Fusu ryushijo bushitsu no kankyo kijun ni tomonau sokutei ho no kento, dai 2 ho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):258, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 119.)*

In accord with the new environmental standard for suspended particulates, expression of particulate weight concentration is necessary. The conversion factors between the data obtained by low volume air sampler and digital dust indicater are obtained for air samples collected at three different locations in Kawasaki. Collection by the low volume air sampler is done at the same location as the digital dust indicator. The conversion factors obtained are 0.8781, 1.0476, and 0.3579, with standard deviations of 0.4122, 0.3986, and 0.2698, respectively. The first two had a similar value, but the third was considerably different because of the different sampling locations having a varying the size of particles. The third sample was collected in a residential area, and others were collected in an industrial area. Therefore, a continuous data collection is necessary to obtain a typical conversion factor which can convert the relative particulate concentration obtained by digital dust indicator into the particulate weight concentration. The conversion factor must also be obtained separately for industrial or residential area.

50185 **APTIC NO. 71735**

Wolf, Freidrich and Karl-Heinz Bergk

ADSORPTION OF HIGHER-BOILING ALKYLMERCAPTANS. *(Adsorption von hochersiedenden Alkylmercaptanen). Text in German. Erdoel Kohle - Erdgas-Petrochem., 27(10):629, Oct. 1974. 17 refs.*

A study was made of the adsorption of alkyl mercaptans with boiling points over 120 C, and with more than 5 carbon atoms, as may be present in natural gas and crude oil, on A and X type molecular sieves with different cations and replacement rates. The molecular sieves were used in powdered form. The pore size necessary for the adsorption of alkyl mercaptans was achieved when 38% of the sodium ions were replaced by bivalent ions in A type molecular sieves, and at an ion exchange rate of about 45% in the case of magnesium-X type molecular sieve. The adsorption of alkyl mercaptans decreased in the order magnesium-A, calcium-A, manganese-A, strontium-A, nickel-A, and zinc A, and, for X type molecular sieves, in the order HX, MgX, CaX, cobalt-X, sodium-X, nickel-X, silver-X, and copper-X. The activation energy for the sorption process was found in a range of 6 and 10 kcal/mol.

50186 **APTIC NO. 71774**

Yanagihara, Shigeru

PROGRESS IN CHAMBER RESERACH AND ITS DIFFICULTIES. *(Chanba kenkyu no shinpo to monditen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):1-9, Nov. 1974. 4 refs.*

Problems in smog chamber experiments are summarized. Smog chamber experiments generally use much higher pollutant concentrations than those observed in the atmosphere because of the difficulties in detection and sampling techniques. The preparation of a purified air maintaining a total background hydrocarbon level below 1.5 ppm is very difficult or requires elaborated steps. The chemiluminescence technique allows detection of a 0.01 ppm level of nitric oxide with adequate reliability; however, the Saltzman method is not reliable for nitrogen oxides levels below 0.1 ppm; moreover, a determination technique for nitrate ion is not yet established. A simulation technique for sunlight is also a problem in smog chamber experiments as the chamber cannot simulate the exact conditions of the atmosphere, such as spectral distribution and light intensity. Although many smog chamber experiments simulating atmospheric chemical reactions have been made in the past 10 yr, the understanding of photochemical reactions and smog formation have not been improved greatly. Thus, ozone formation is still being used as the index of photochemical reactions.

50187 **APTIC NO. 72034**

Yanagihara, Shigeru

PHOTOCHEMICAL SMOG AND NITROGEN OXIDES. *(Kokagaku sumoggu to NOx). Text in Japanese. Seikatsu to Kankyo (Life Environ.), 19(11):11-18, Nov. 1974.*

Nitrogen oxides, together with hydrocarbons, are involved in the formation of atmospheric ozone. The experiments of Romanovsky, in which the effects of varying propylene and nitric oxide concentrations on peak O3 yields were determined, revealed that the ratio of HC to NOx was very significant even at low concentrations. Ozone is formed very slowly when the ratio is below 2-3. When the ratio exceeds 150 the reaction proceeds swiftly. Ozone concentration can be reduced by reducing the ratio of HC to NOx.

50188 **APTIC NO. 75272**

Yankovskiy, S. S. and L. N. Tovgina

INSTRUMENT FOR DEW POINT MEASUREMENT OF INDUSTRIAL GASES. *(Pribor dlya izmereniya tochki rosy tekhnologicheskikh gazov). In: Devlelopment of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1 p. 131-134 Sept. 1974. 2 refs. Translated from Russian, 6p. (Entire report of TR 104-75 processed under APTIC 70040.)*

An instrument for the in situ measurement of stack gas dew point during the evaluation of dust control equipment is described. The instrument consists of a brass cup (filled with a liquid such as glycerin) inside of which a mercury thermometer and a tubular water cooler are secured. An electrode, separated from the surface of the cup by a resin film, is fastened to the end section of the cup. Voltage is supplied to the electrode by a 60 volt battery, the other end of which is connected to the instrument housing through a microammeter. In operation, the battery circuit is closed by the formation of a moisture film on the lateral cylindrical surfaces of the polyfluoroethylene resin gasket separating the electrode from the cup. The dew point is obtained by noting the temperature in accordance with the microammeter readings.

50189 **APTIC NO. 75283**

Yankovskiy, S. S. and Y. I. Tsyss

METHOD OF DETERMINATION OF STICKINESS OF DUST. *(Sposob opredeleniya slipayemosti pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 16-17, Sept. 1974. Translated from Russian, 2p. (Also: Russ. Pat 258730.) (Entire report of TR 104-75 processed under APTIC 70040.)*

A method for determining dust stickiness based on the tensil strength of a previously formed dust layer is described that allows for greater accuracy of measurement than prior-art methods. Unlike other methods, thelayer is formed by filtration between two flat filters. One of the filters is securely fastened and the other is able to move along the axis. The tearing of the layer is accomplished by applying an axial load to the movable filter.

50190 **APTIC NO. 75285**

Yankovskiy, S. S., G. M. Aliyev, A. A. Rusanov, and Y. I. Andrianov

SENSOR FOR MEASUREMENT OF DUST RESISTANCE. *(Datchik klya izmereniya soprotivleniya pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1. p. 21-23, Sept. 1974. Translated from Russian, 3p., (Also: Russ. Pat. 302674.) (Entire report of TR 104-75 processed under APTIC 70040.)*

A sensor device for resistance measurement of dust samples from cyclone-type devices is described that is simpler and more accurate than prior-art devices. The improvements comprise electrodes in the form of ceramet filters. The electrodes are mounted on the ends of gas-suction tubes and are fastened parallel to each other. Dust-laden gas is sucked through the gas-suction tubes across the electrodes, with a dust layer of uniform density being formed in the gap between the electrodes. The resistance of thy dust layer is then measured with an appropriate device.

50191 **APTIC NO. 75267**

METHODS USED IN USSR FOR DETERMINATION OF CONCENTRATIONS AND PHYSICAL AND CHEMICAL PROPERTIES OF DUSTS. *(Metody opredeleniya kontsentratsii i fiziko-khimicheskikh svoystv pyley, primenyayemyye v SSSR). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-10, Sept. 1974. Translated from Russian, 10p. (Entire Report of TR 104-75 processed under APTIC 70040.)*

Methods for the measurement of various dust parameters are outlined. Techniques are reviewed for the following types of measurements: dust particle size, dust density, dust concentration, dust stickiness, electrical resistance, angle of repose, and wettability. Techniques are also reviewed for the measurement of such flue gas parameters as pressure, velocity, and humidity. Sampling procedures for acid mists and tarry substances are also covered.

50192 **APTIC NO. 75277**

METHODS OF INVESTIGATION OF DUST WETTABILITY *(Metody issledovaniya smachivayemosti pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR En-*

vironmental Agreement, Proj. A-4, Task 1. p. 1-25, Sept. 1974. Translated from Russian, 25p. (Also: In: Laboratornyye i Proizvodstvennyye Ispytaniya Smachivayemosti Pyli, p. 74-91.) (Entire report of TR 104-75 processed under APTIC 70040.)

Methods for determining dust wettability are reviewed. Techniques covered include: impregnation of a powder with a wetting liquid, film flotation, wetting with falling drops, wetting a suspended powder with a liquid counterjet, and bubbling. Since wetting agents display maximum efficiency in the case of film flotation (sometimes exceeding their efficiency under conditions of simultaneous collisions of drops with dust), an inefficient result with the flotation method is a guarantee of the wetting agents unsuitability for dust control. Data are tabulated on the wettability of various dusts.

50193 **APTIC NO. 75282**

DETERMINATION OF ANGLE OF REPOSE (REST). *(Opredeleniye ugla otkosa (pokoya)). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 14-15, Sept. 1974. Translated from Russian, 2p. (Entire report of TR 104-75 processed under APTIC 70040.)*

A device for determining the angle of repose of settling particulate material is described. A sample of the material is poured onto the instrument in a pile. Pouring is continued with a wide-mouth test tube until the top of the pile reaches the upper surface of the instrument at an intersection point with the side walls. The angle of repose (rest) is expressed in degrees.

1973

50194 **APTIC NO. 71962**

Geacintov, Nicholas E.

REACTIVITY OF POLYNUCLEAR AROMATIC HYDROCARBONS WITH O2 AND NO IN THE PRESENCE OF LIGHT. *New York Univ., New York, Chemistry Dept., Environmental Protection Agency Grant R801393, ROAP 21BLD, Program Element 1AA005, Rept. EPA-650/1-74-010, 35p., Dec. 1973. 10 refs.*

NTIS: PB 238 294/AS

The reactivity of 20 different polynuclear aromatic hydrocarbons (adsorbed on solid polystyrene fluffs) with oxugen and nitric oxide in the presence of light was studied. The reaction conditions simulated those encountered in polluted atmospheres. The photoexcited triplet and singlet states of the aromatic hydrocarbons reacted predominantly via the quenching of fluorescence and phosphorescence by paramagnetic O2 and NO gases. The quenching of triplets by oxygen occurred via the formation of an intermediate collision complex in which electrophilic exchange type interactions appeared to be important. The probability of quenching per collisional encounter and the formation of singlet O2 did not exceed 0.01-0.10 and depended on spin selection rules, the triplet energy, and the electron density (in the case of monomethyl derivatives of benz(a)anthracene). This probability was much lower (0.0005-0.005) in the case of NO quenching of triplets and appeared to be a charge-transfer process for molecules with a high triplet energy. The quenching of singlet excited states by O2 and NO was much more efficient than the quenching of triplets and had a probability in the range of 0.30-1.0; it was not necessarily diffusion controlled. The most important contribution of the photoexcited aromatic hydrocarbons (per photon absorbed) to the photochemistry of atmospheres containing O2 and NO was the generation of single O2, since photochemical degradation of the compounds studied was negligible compared to quenching. Although the correlation between the quenching probability of triplets of monomethyl derivatives of benz(a)anthracene by oxygen and the carcinogenic activity of such compounds was not clear, the relatively low photodynamic activity of 7 and 12 monomethyl derivatives appeared understandable in terms of their low triplet lifetimes and lower probability of singlet oxygen formation per collisional quenching encounter. (Author abstract modified)

50195 **APTIC NO. 69663**

Harms, L.

EXPERIMENTAL INVESTIGATION OF THE FLOW FIELD OF A HOT TURBULENT JET WITH LATERAL FLOW. PART I. *(Experimentelle Untersuchungen ueber das Stroemungsfeld eines heissen, turbulenten Strahles bei Queranstroemung). Deutsche Forschungs-und Versuchsanstalt fuer Luft- und Raumfahrt E. V., Braunschweig (West Germany), Rept. IB 157 73 A 18, 62p., Sept. 17, 1973. 23 refs. Translated from German. Scientific Translation Service, Santa Barbara, Calif., 60p., June 17, 1974. National Aeronautics and Space Adminstration Contract NASw-2483, NASA- TT-F-15707.*

NTIS: N74-26798

The three-dimensional flow field of a hot round jet was measured in a 3-meter wind tunnel with the effect of a transverse flow using a nine-hole probe at several intersection planes. The influence of various velocity and temperature conditions on the flow field was studied. The measurements were compared with the results for the cold jet in a transverse flow. This led to new laws regarding the mixing of a hot jet with its surroundings. The investigations on cold and hot air jets in cross winds for jet velocity to cross wind velocity ratios of 4.8 and 11.3 showed that the well-known initial kidney-shaped deformation of the jet cross-section due to the normal cross wind very soon leads to the formation of a pair of vortices rotating in opposite directions. This vortex pair limits the deflected engine jet to the side with respect to its symmetry plane. The velocity along the jet core is described by the theory. It decreases rapidly, so that at a distance of about seven nozzle diameters behind the center of the nozzle, less than 10% of the different velocity between the jet and the cross flow can be measured. On the other hand, higher velocities occur in the vortex cores up to large distances. For the same jet to cross wind velocity ratio, the heating of the jet brings about a larger deflection of the jet and the vortex cores. Compared with the velocity fields found for the same exhaust jet to cross flow momentum ratio, the positions of the jet core and the vortex pair are essentially conserved, even though the velocity vectors in the vicinity of the vortex cores would lead one to conclude that there was a greater jet expansion. Examples of flows to which this study can be applied include the smoke plumes of chimneys in the atmosphere.

50196 **APTIC NO. 72019**

Hecht, Thomas Arnold

DEVELOPMENT OF A GENERALIZED KINETIC MECHANISM FOR PHOTOCHEMICAL SMOG. *California Inst. of Technol., Pasadena, Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 73-31,042, 284p., 1973. 123 refs.*

A generalized kinetic mechanism for photochemical smog is formulated and validated. The mechamism is applicable to a large number of hydrocarbons rather than just a specific hydrocarbon and takes advantage of the general features of smog formation to maintain a minimum number of reactions and species. The mechanism is validated using n-butane-nitrogen oxides, propylene-NOx, and n-butane-propylene-NOx smog chamber data at 13 different sets of initial reactant concentrations and a wide variety of hydrocarbon to NOx ratios. In general there is good agreement between predicted and measured concentrations, though substantial uncertainties exist in the magnitude of light intensity and initial nitrogen dioxide concentrations as well as in the values of measured concentrations of hydrocarbons, nitric oxide, nitrogen dioxide, and ozone. The predicitions of the lumped mechanism agree most closely with the experimental data when the initial NOx concentrations is less than about 0.5 ppm, a condition typical of polluted atmospheres. Predicted peroxyacyl nitrate concentrations are in good agreement with two of three sets of validation data used. Sources of uncertainty in the mechanism include gaps in the knowledge of rate constants and mechanisms and effects related to smog chamber systems which either alter or incorrectly monitor the course of smog formation in controlled experimental studies.

50197 **APTIC NO. 71959**

Lapp, M., C. M. Penney, and J. A. Asher

APPLICATION OF LIGHT-SCATTERING TECHNIQUES FOR MEASUREMENTS OF DENSITY, TEMPERATURE, AND VELOCITY IN GASDYNAMICS. *General Electric Co., Schenectady, N. Y., Research and Development Center, Air Force Contract F33615-71-C-1867, Proj. 7065, Rept. ARL-73-0045, 93p., April 1973. 98 refs.*

NTIS, DDC: AD 759575

Methods based on light-scattering techniques for the three-dimensional measurement of density, temperature, and velocity was evaluated for application to wind tunnel studies for air (0.001-100 psia, 30-2000 R, and 0-5000 ft/sec). Recommended approaches are laser Doppler velocimetry for velocity measurement and rotational and vibrational Raman scattering for temperature and density measurement. The laser Doppler velocimeter technique is in the advanced stage of development, while the Raman approach is innovative. The Raman techniques appear to be applicable to extreme test conditions corresponding to 2000 R and 1500 psia stagnation conditions, which lead to a density of 6.6 times 10 to the 16 molecules/cc. The density measurements based on vibrational Raman scattering are almost completely independent of temperature, and the temperature measurement technique (involving the ratio of rotational to vibrational Raman scattering) is entirely independent of density.

50198 **APTIC NO. 71956**

Stiles, Albert Richard

A COMPARISON OF THE OPTICAL PROPERTIES AND PARTICLE SIZE DISTRIBUTION OF DIESEL EXHAUST USING A THEORETICAL SCATTERING MODEL. *Purdue Univ., Lafayette, Ind., Dept. of Environmental Sciences, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 74-5053, 1973, 233p. 34 refs.*

Experiments were conducted to measure the light scattering characteristics and size distribution of diesel exhaust and to determine the refractive index of diesel exhaust using a comparison between the measured scattering data and a calculated scattering model based on the sizing measurements. A polar nephelometer was constructed, and the scattering characteristics of diesel exhaust were measured using incident illumination of 4500 A and 5550 A, vertical and horizontal polarizations, and scattering angles between 80 and 160 deg. Sizing measurements were conducted with an instrument based on Stokes settling and the piezoelectric effect. Differences between the scattering characteristics of the diesel exhaust for the two wavelengths indicated that its refractive index is wavelength-dependent. The most distinctive feature in the scattering results was the occurrence of minima near the 100-degree scattering angle for horizontal polarization. Identification of the type of diesel fuel can thus be achieved by comparing the exhaust scattering results for the same incident wavelengths and horizontal polarization. A classification of diesel engines according to combustion characteristics also appears possible by comparing exhaust scattering data for a number of engines. The performance of the sizing instrument proved the feasibility of using Stokes settling and the piezoelectric effect to size aerosol polydispersions. The calculated scattering model failed to produce a satisfactory curve-fit and locate the correct refractive index, perhaps due to the employment of an insufficient number of representative particle sizes and/or the chemical complexity of the exhaust aerosols. (uthor abstract modified)

50199 **APTIC NO. 67835**

Yang, Wen-Jei

HEAT TRANSFER AND FLOW FRICTION PERFORMANCE OF HEATED PERFORATED FLAT PLATES (FINAL REPORT). *Mich. Univ., Ann Arbor, Mich., Dept. of Mechanical Engineering, Office of Air and Water Programs Contract 68-04-0019, Rept. APTD-1554, 140p., June 1973. 11 refs.*

NTIS: PB 236675/AS

A large scale modeling technique was developed to examine the effects of perforation geometry on the heat transfer and friction loss performance of compact heat exchanger fins in connection with the design of air-cooled condensers for Rankine cycle automobile engines, marine power propulsion systems, and dry cooling towers of extra-high capacity electric power plants. Plates perforated with smaller slots appear to give better overall heat transfer-friction loss performance, with the optimum plate thickness to plate spacing ratio being between 0.0665 and 0.141. The optimum surface porosity for all slotted plates appears to be between 15 and 22%, taking noise problems into consideration. An increase in the slot length results in a slight decrease in the friction factor but an increase in the heat transfer factor. The degree of slot overlapping in the flow direction has little effect on the friction factor to heat transfer ratio.

1972

50200 **APTIC NO. 75158**

Barlow, Richard E. and Nozer D. Singpurwalla

AVERAGING TIME AND MAXIMA FOR DEPENDENT OBSERVATIONS. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-21, 1974. 16 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

A mathematical approach to the analysis of air pollution data is presented, with particular application to carbon monoxide data. An autoregressive process of suitable order is used to model certain air pollution data. The application of extreme value theory is expanded by showing that the extreme value distribution is a lower bound on the distribution function of the maxima of observations generated by an associated stochastic process.

50201 **APTIC NO. 71571**

Cvetanovic, R. J.

THE CHEMISTRY OF SMOG-FORMING REACTIONS. *Preprint, National Research Council of anada, Ottawa, Div. of Chemistry, p. 24-31, 1972 (?). 53 refs.*

The chemistry of smog-forming reactions is reviewed. Photochemical smog is triggered by the photolytic production of oxygen atoms from nitrogen dioxide and their subsequent interaction with hydrocarbon pollutants and oxygen in the atmosphere. An important product is ozone which further contributes to the overall complexity of the reaction. Other major compounds involved in smog-producing reactions include carbon monoxide, carbonyl compounds, and peroxyacyl nitrates. Although the reactions of free oxygen atoms with olefins in the absence of molecular oxygen are well understood, the reactions in the presence of oxygen, as in photochemical smog reactions, are more complex, and their overall mechanism is much less clear. Rate constants are tabulated for reactions between free oxygen atoms and various hydrocarbons. Addition products and their approximate fractions are also tabulated for reactions between free oxygen atoms and various olefins at room temperature.

50202 **APTIC NO. 75162**

Lynn, David A.

FITTING CURVES TO URBAN SUSPENDED PARTICULATE DATA. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-28, 1974. 6 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

A number of theoretical frequency distributions are compared with respect to their ability to fit bodies of urban air quality data, in particular suspended particulate data from Philadelphia. A two-parameter log normal curb gives the best data fit when compared to a three-parameter log normal, a Gamma, and a four- parameter Pearson distribution. The reason for the most inflexible distribution giving the best fit is due to the insensitivity of the two-parameter log normal curve to the upper tail of the distribution. As a consequence, square, blocky distributions can not be fit well unless they have a very short tail.

50203 **APTIC NO. 75161**

Saltzman, Bernard E.

FOURIER ANALYSIS OF AIR MONITORING DATA. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-13, 1974. 6 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

The utilization of Fourier spectra analysis in conjunction with computer programs for analyzing air pollution monitoring data is described. Fourier amplitude spectra and peak time data are graphically illustrated for sulfur dioxide, total hydrocarbons, and suspended lead. The data consist of a series of concentration values at uniform time intervals, and provisions are made for missing data. Fluctuations are resolved as the sum of a series of sine and cosine waves of different amplitudes and periods. Calculations are carried out on a small computer (Wang system) which requires approximately 1 millisecond for each step. Approximately 10,000 steps are required for the calculations on each data point. The Fourir analysis technique shows promise for identifying common factors operating to determine pollutant levels and offers a means of correcting data for the incomplete response characteristics of sampling methods and/or instrumentation.

50204 **APTIC NO. 69402**

Tojwani, G. D. T.

COMPUTED LINEWIDTHS OF SO2. *Tennessee Univ., Knoxville, Earth Resources and Astrophysics Lab., National Aeronautics and Space Administration Research Grant NGL 43-001-021, NASA-CR-137083, UTPA-ERAL-02, 36p., Nov. 1972. 17 refs.*

NTIS: N74-17867

Self-broadened and foreign-gas (nitrogen and oxygen) broadened linewidths of sulfur dioxide, for both type A and type B bands, were calculated using the Anderson-Tsao-Curnutte theory of line broadening. Computed values of these linewidths at 300 K are given for all the transitions with J less than 20 and K sub -1 less than 15. Air-broadened linewidths were also calculated for sulfur dioxide at 250 K and 200 K for these transitions. (Author abstract)

1971

50205 **APTIC NO. 71894**

Huber, E. W., D. Stock, and F. Pischinger

INVESTIGATION OF MIXTURE FORMATION AND COMBUSTION IN A DIESEL ENGINE WITH THE AID OF THE SCHLIEREN METHOD. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-29. 7 refs.*

The use of the Schlieren film technique for examining the phenomena of mixture formation, ignition, and combustion in a single-cylinder diesel test engine with direct injection is described. The Schlieren films permit the quantitative determination of the following engine parameters: air-swirl velocity, fuel spreading in the combustion chamber, jet evaporation period, and radial movement of the fuel vapor and flames in a swirl area. Additionally, the films permit examining the first ignition phase, the location of the first ignition, the rate of pressure rise, the flame colors, and the burning time of the flames. (Author summary modified)

1940

50206 **APTIC NO. 70063**

Volmer, Max and Hakon Flood

DROPLET FORMATION IN VAPORS. *(Troepfchenbildung in Daempfen). Z. Physik Chem. (Leipzig), 170(3-4):273-285, 1940 (?). 16 refs. Translated from German, 19p.*

Droplet formation in adiabatic expansion of vapors was investigated to test the nucleation theory of Volmer and Farkas. The dependence of the critical supersaturation for water vapor on the temperature was in satisfactory agreement with the theory. The value of the critical supersaturation was determined for seven organic vapors, including water, methyl alcohol, ethyl alcohol, n-propyl alcohol, isopropyl alcohol, n-butyl alcohol, nitromethane, and ethyl acetate. Good approximation to the theoretically calculated value was found in six cases.

EFFECTS-HUMAN HEALTH

1975

50207 **APTIC NO. 71831**

Adachi, S. and T. Okubo

HEALTH DISTURBANCE AND AIR POLLUTION IN METROPOLITAN TOKYO. AN ANALYSIS OF THE NATIONAL HEALTH INSURANCE. *(Tokyo-to no taiki-osen chiku ni okeru kokuho jushin jokyo kara mita kenko-shogai ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 29(6):543-551, Feb. 1975. 11 refs.*

National health insurance bills were examined for 1971 on 6776 insurants in the highly polluted area of Kojiya (A) and on 8735 insurants in the relatively less polluted area (B) to obtain information on health insurance and air pollution. The years average concentrations of sulfur dioxide, nitrogen dioxide, nitric oxide, oxidants, carbon monoxide, and floating dust were 5.0(2.0), 4.4(3.7), 5.5(3.7), 4.0(3.0)pphm, 3.3(3.1) ppm, and 0.14(0.07) mg/cu m. Parenthetical values belong to area B. The age-adjusted incidence (average frequency of new consultation/person/year) of all respiratory and otogenic diseases was higher in area A. Common colds in infants, rhinitis, and chronic and acute bronchitis were more frequently found in area A. The increase of cases of chronic respiratory diseases was noticed in younger men in area A. An increase of otitis media was noted in insurants in area A younger than 20, suggesting a relationship to diseases in upper airway.

50208 **APTIC NO. 72369**

Aizawa, R., K. Hirara, T. Izumi, and S. Mori

ENVIRONMENTAL POLLUTION BY AUTOMOTIVE SOURCE, PART II: LOCAL INHABITANTS S REACTION TO ENVIRONMENTAL POLLUTION. *(Sharyo katsuryo kara mita kankyo-osen Dai2-ho. Kankyo osen ni taisuru chiiki jumin hanno no jittai). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):154, April 1975.*

The reaction of inhabitants to auto exhaust, noise, and vibration was surveyed in commercial and residential quarters by inquiries and measurement of the carbon monoxide in expired air of the inhabitants. About 65% of the inhabitants of busy quarters complained of severe reactions to autoexhaust, noise, and vibration; physical effects included headache, absentmindedness, loss of appetite, prickling of eyes, pain in the throat, and frequent colds. The concentration of carbon monoxide in the expired air of inhabitants of residential quarters was about 5 ppm, and in the busy quarter with much motor traffic the concentration was about 10 ppm. The concentration of carboxyhemoglobin in blood of the latter averaged 2.5 - 2.6%, and the former was 1.5%. The data were taken among non-smokers, and there were socio-economic differences among inhabitants of both quarters.

50209 **APTIC NO. 72318**

Amer, Nabil M., Robert M. Graven, Robert J. Budnitz, and Dick A. Mack

INSTRUMENTATION FOR ENVIRONMENTAL MONITORING IN BIOLOGICAL SYSTEMS. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Nucl. Sci., vol. NS-22:633-635, Feb. 1975. 1 ref.*

Techniques for monitoring the effects of pollutants in biological systems are discussed. The status of instrumentation varies from one pollutant to another. Techniques are well established for detecting trace metals such as lead, mercury, cadmium, and nickel; pesticides and herbicides; and ionizing radiation. This is, however, not the case for gaseous and liquid pollutants. The techniques for measuring carbon monoxide are based on the fact that oxyhemoglobin in oxalated blood is completely reduced in the presence of small amounts of sodium hydrosulfite, whereas carboxyhemoglobin is not. There is no laboratory method for measuring sulfur dioxide. Since the concentration of sulfur- sulfonate in blood plasma increases as a function of exposure to SO2, the biological monitoring of plasma S-sulfonate may provide a useful measurement technique to verify and quantify SO2 exposure. The extent of exposure to asbestos and other microparticulates is determined by analysis of lung tissue samples.

50210 **APTIC NO. 72201**

Buechner, Howard A.

ORGANIC DUSTS: CRITICAL EMERGING HEALTH HAZARD. *Int. J. Occup. Health Saf., 44(1):22-24, 36, Jan.-Feb. 1975. 1 ref.*

The relationship between organic dusts and hypersensitivity pneumonias is reviewed, with particular emphasis on bagassosis. Hypersensitivity pneumonia may be caused by a variety of antigens including animal proteins, fungi spores, and various microorganisms. Antibodies to these organisms can be demonstrated in the blood of sensitized individuals by agar-gel double-diffusion techniques and elevated levels of specific immunoglobulins. Bagassosis regarded as a model for all of the hypersensitivity pneumonias. The disease is caused by the inhalation of thermophilic actinomycetes and possibly other microorganisms contained in the dust from dried bagasse which is the dried fibrous material remaining after the sugar-containing juice is extracted from sugar cane in the processing cycle. Treatment consists of separation of the patient from contact with bagasse dust. Severe symptoms may be modified and the duration of the illness shortened by the use of corticosteroids. A listing is given of various types of hypersensitivity pneumonias, the corresponding exposure conditions, and the antigens associated with the disease.

50211 **APTIC NO. 72063**

Civil, G. W., A. G. Heppleston, and C. Casswell

THE INFLUENCE OF EXPOSURE DURATION AND INTERMITTENCY UPON THE PULMONARY RETENTION AND ELIMINATION OF DUSTS FROM HIGH AND LOW RANK COAL MINES. *Ann. Occupational Hyg., 17(3-4):173-185, 1975. 31 refs.*

Groups of specific pathogen-free rats were exposed in dust chambers to respirable dusts obtained from the atmosphere and from seam coal of high and low rank coal mines to study the influence of exposure duration and intermittency on pulmonary retention and elimination. For each dust four experiments were conducted in parallel, two exposures lasting 480 hr each and two lasting 960 hr. For each duration one exposure was given continuously, i.e., over 6 or 12 consecutive wk, and the other exposure intermittently, i.e., three periods of 160 hr (2 wk) or 320 hr (4 wk) separated by intervals of 4 k in normal atmosphere. The variables studied exhibited no consistent influence on bronchial clearance. Lymphatic elimination was mainly determined by the size of the pulmonary dust burden. A high rank coal mine dust, especially in high concentrations, produced an unusual histological reaction in which alveoli were observed to contain enlarged macrophages with relatively few intracellular particles. As exposures were prolonged, the percentage of pulmonary retention was more consistently reduced with the lower ranked dusts. If this feature occurs in coal workers, the overall accumulation of dust during extended periods of exposure may be less in low rather than in high rank pits. Although the latter feature somewhat explains the lower prevalence of coal workers pneumoconiosis in low rank pits, there is no evidence that differential pulmonary clearance rates are involved. (Author abstract modified)

50212 **APTIC NO. 71940**

Coffin, D. L., D. E. Gardner, and E. J. Blommer

TIME/DOSE REPONSE FOR NITROGEN DIOXIDE EXPOSURE IN AN INFECTIVITY MODEL SYSTEM. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 17p., 1975 (?). 26 refs.*

Preliminary results from time/dose response studies of mice exposed to nitrogen dioxide prior to being infected with Streptococcus pyogenes are presented. The dose-response studies were conducted utilizing a concentration-time product of seven (3.5 ppm NO2 for 2 hr). During short-term exposures to NO2, the concentration employed exhibited a much greater influence on infectivity than the duration of NO2 exposure for the same concentration-time product (seven). Significant increases in toxicity were observed with time during continuous exposures to concentrations of NO2 as low as 0.5 ppm. Intermittent responses at a constant NO2 as low as 0.5 ppm. Intermittent responses at a constant NO2 concentration of 3.5 ppm also showedan increased effect with exposure duration, though the exact slope of the relationship was not clear. Acute NO2 exposure appears to have a destructive action on pulmonary alveolar macrophages which are postulated to be the chief pulmonary defense against infectious agents introduced via the airway. However, since these cells are continually renewed, the results from the intermittent model studies indicate that the action of NO2 on infectivity is not solely a direct effect on the macrophages. The enhancement of pulmonary infectivity following long-term or repeated NO2 exposures might be explained by other damages occurring in the lung and an effect on the alveolar macrophages prior to their emergence into the lung.

50213 ***APTIC NO. 71957***

Gardner, Donald E., Joseph W. Illing, Frederick J. Miller, and David L. Coffin

THE EFFECT OF OZONE ON PENTOBARBITAL SLEEPING TIME IN MICE. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Pathobiology Research Branch, 12p., 1975 (?). 28 refs.

The effect of repeated daily exposure of 5-6-week-old female mice (Charles River COBS strain) to ozone (1.0 ppm for 3 hr/day up to 7 days) on sleeping time induced by intraperitoneally or intramuscularly administered pentobarbital sodium (50 mg/kg) was investigated. Ozone exposure resulted in significant increases in sleeping time, with the differences being manifested consistently when pentobarbital sodium anesthesia followed the second and third ozone exposure. Mice exposed to ozone for two days showed sleeping times increased by 18 min over the control sleeping period of 21 + or - 3 minutes for nonexposed mice. No differences were observed after a single exposure or after four or more successive daily exposures to 1.0 ppm ozone. Increasing the ozone concentration to 5 ppm (single 3-hour exposure) after seven daily 1.0 ppm exposures increased the sleeping time to 59.5 min. Although the mechanism of the ozone-induced change in barbituate sleeping time is not known, the possibility of the interaction of an ozone-induced intermediate with hepatic microsomal enzymes is suggested. (Author abstract modified)

50214 **APTIC NO. 72372**

Ikari, K.

ACID RAIN IN THE KARATSU DISTRICT. *(Karatsu-chiho ni okeru sansei kou ni tsuite). Text in Japanese. Taiko Osen Nyusu (Air Pollution News), no. 86:4-6, Jan. 1975.*

After an intermittent rainfall very early in the morning in Aug. 28, 1974, a report was made on a sudden spot-like discoloration of morning glory flowers in Karatsu city. The part of the flower petal wet by raindrops were completely discolored; however, without any injury to other plants except for a slight color change of the salvia flower. This discoloration phenomenon of morning glories covered the city and its surroundings, and in severe cases the discolored spots became necrotic and the cell walls were destroyed. The pH of rain water collected early in the morning was as low as 3.9 - 4.1. Meteorological records show that the plants were attacked by rainfall between 7 - 9 am. An oil-burning power station (capacity of 1 million KW) at the center of the city, could not be directly blamed for the acid rain utilizing present data.

50215 **APTIC NO. 72307**

Jagiello, G. M., J. S. Lin, and M. B. Ducayen

SO2 AND ITS METABOLITE: EFFECTS ON MAMMALIAN EGG CHROMOSOMES. *Environ. Res., vol. 9:84-93, 1975. 15 refs.*

In vitro studies with mouse, ewe, and cow oocytes and in vivo studies with adult cycling female Camm mice were conducted to investigate the possible mutagenic action of the sulfur dioxide metabolite sodium sulfite. The in vitro studies revealed fragmentation and rearrangement during the first and second metaphase stages of meiosis. Anaphase lagging which is a classic predictor of aneuploidies in progeny produced by fertilization of such ova was also noted in each species. Despite the absence of any of these genetic abnormalities in the ova of mice administered intravenous doses of sodium sulfite (1.0-5.0 mg), the in vitro results suggest that sulfur dioxide and its metabolites be considered as possible etiologies in contaminated areas with fetal loss or congenital abnormality.

50216 **APTIC NO. 72380**

Kawai, H., R. Endo, and K. Takemoto

RELATION BETWEEN THE DEGREE OF LUNG POLLUTION BY AIR POLLUTION AND HEAVY METALS. *(Taiki-osen ni yoru hai-osendo to jukinzoku no kankei). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):164, April 1975.*

Human and dog lungs were analyzed for 13 kinds of heavy metals. The human lungs (all of Tokyo citizens) showed a broad range of dust sedimentation, some correlation between the degree of pollution and the amount of cadmium, nickel, and chromium only, and conspicuous individual differences seemingly due to occupation. No correlation was found between the amount of pulmonary metals, and age, or sex. In dog lungs there was no correlation between the local pollution and the amount of iron, copper, zinc, cobalt, and cadmium. Cadmium, nickel, lead, and chromium, showed a correlation between local air pollution in human lungs. In dogs obtained in Korea, Ni and Cr were higher in dog lung obtained in Jinsen.

50217 **APTIC NO. 71617**

Kettner, H. and W. Erdmann

ESTIMATE OF THE HEALTH HAZARD OF THYPOPULATION BY FLUORIDE IMMISSIONS. *(Die Abschaetzung des gesundheitlichen Risikos der Bevoelkerung durch Fluorid-Immissionen). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 37(1):32-36, 1975. 17 refs.*

A review of foreign literature on the effects of fluorine emissions on man (adults and children) and animals is given. Mainly the effects of hydrogen fluoride, sodium fluoride, aluminum trifluoride, and Na3AlF6 are discussed. The Verein Deutsche Inginieure guideline issued in Sept. 1974 has set the following maximum allowable immission concentrations in micrograms F/cu m: hydrogen fluoride 50, aluminum fluoride, sodium fluoride and cryolithe 100, and calcium fluoride 200 over a period of 1 yr.

50218 **APTIC NO. 72382**

Maeda, S.

CONSIDERATION OF ENVIRONMENTAL HEALTH BY A CLINICIAN. *(Rinshoi to shiteno kankyo hoken o kangaeru). Text in Japanese. Ao to Midori (Blue Green), 4(1):55-57, Dec. 1974 Jan. 1975.*

Cases of environmental pollution caused by air pollutants such as sulfur dioxide and selenium dioxide from mines, hydrogen fluoride from aluminum refineries, exhausts from ironworks, petrochemical industry emissions, motor vehicle exhaust, and photochemical smog are reviewed. Regulation of environmental pollution should be based on the most susceptible populations such as infants and the elderly. Research into treatment for individual symptomatology for air pollution-related diseases should accompany national control programs for emission reduction.

50219 **APTIC NO. 72283**

Mierau, Gary W. and Blaise E. Favara

LEAD POISONING IN ROADSIDE POPULATIONS OF DEER MICE. *Environ. Pollut., 8(1):55-64, Jan. 1975. 21 refs.*

Deer mice living adjacent to a major Colorado highway (19,800 vehicles/day flow rate) were examined to determine if current levels of lead pollution from automobile exhaust presents a hazard to this species. The level of environmental lead contamination, as measured by lead concentration in surface soil and vegetation was significantly greater 15 m from the highway than at a control site 800 m distant. Lead levels for bone, kidney, liver, and brain tissue of the exposed mice were 52.10 + or - 33.81, 8.46 + or - 3.03, 3.29 + or - 1.77, and 0.84 + or - 0.25 ppm, respectively, as compared to control values of 4.84 + or - 5.63, 3.28 + or - 2.40, 1.06 + or - 0.60, and 0.14 + or - 0.06 ppm, respectively. Although the lead levels in exposed mice were significantly higher than for controls, lead poisoning in the former was not demonstrated. The exposure level required to produce recognizable lead poisoning in experimental populations was approximately five times greater than that experienced by the wild population; thus lead pollution from automobile exhaust appears to have little impact on the health and ecology of this species. (Author abstract modified)

50220 **APTIC NO. 71733**

Morimoto, N., T. Kimura, and K. Saito

ON THE ARSENIC POLLUTION IN AN AREA AROUND A MINE. *(Sasagaya shuhenchiku no hisoosen ni tsuite). Text in Japanese. Shimane-ken Eisei Kenkyusho Nenpo (Annu. Rep. Shimane Prefect. Public Health Inst.), no. 15:49-52, 1975.*

Dust samples taken from around the buildings adjacent to an abandoned mine were analyzed for arsenic. The results were 55.0 + or - 55.0 ppm (0 - 2 km from the mine), 16.0 + or - 14.0 ppm (2 - 3 km), 12.0 + or - 7.9 ppm (3 - 4 km) and 2.9 + or - 0.8 ppm (control), suggesting that the houses located within 4 km from the mine were polluted by smoke and dust containing arsenic from the mine. One hundred sixty one specimens of hair from the inhabitants fround the mine were analyzed for arsenic, 90 specimens being taken from inhabitants who live within 5 km. The value of arsenic content of the 90 specimens was on the average 0.25 + or - 0.20 to 0.63 + or - 0.62 ppm, and that of 71 specimens from outside 5 km was 0.16 + or - 0.21 ppm. The control value was 0.17 + or - 0.24 ppm, showing a significant relationship between the distance from the mine and the smoky dust. Analytical values of arsenic in their nails gave no such relationship.

50221 **APTIC NO. 72367**

Nakajima, Y., S. Kusumoto, H. Otsu, and G. Ide

ON THE MORPHOLOGICAL CHANGE OF MOUSE S LUNG BY EXPOSURE TO OXIDANT AND THE EFFECTS AFTER STOPPING EXPOSURE. *(Okisidanto bakuro mausu ni okeru haino keitaigaku-teki kenka oyobi sono bakuro chushi go no eikyo ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):161, April 1975.*

Four groups of JCL-ICR female mice, each group consisting of 10 animals, were respectively treated from the age of 3.5 weeks as follows: a 1-month exposure followed by a 3-month exposure to an artificially prepared photochemical oxidant at 0.1 - 0.5 ppm, 2 - 3 hr/day, 5 days/wk; 1 mo of exposure to the same oxidant; and 1 mo in a clean air room. Pathological findings included a slight to moderate diffuse interstitial pneumonia after 1 mo of exposure. After 3 month s exposure the acute pneumonic inflammation became very slight without proliferation of the bronchial epithelial cells, rather than with atrophic squamatization. The tissue surrounding the bronchioles became fibrous and with a slight accompanying infiltration of round cells. Inside the bronchus expansive degenerative denaturation predominated. After 1 mo in clean room following the 1-month exposure to the oxidant, the acute inflammatory symptoms disappeared with a slight expansion of the bronchiolar cavity and fibrosis around the bronchii. It was slighter than in those exposed for 3 mo. The longer the exposure therefore, the higher the morphological changes occurring in the lung tissue.

50222 **APTIC NO. 72371**

Nobutomo, K. and S. Ishinishi

CYTOLOGICAL DIAGNOSIS OF SPUTUM AND RESPONSE OF RESPIRATORY SYSTEM TO AIR POLLUTION. *(Kabutan-saiboshin to taikiosen-sei kokyuki hanno). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):166, April 1975.*

A cytological examination of sputum specimens from citizens in Omuta, Fukuoka, O, and T cities excreted within 1 hour of rising is described. There was a difference in thr response of the respiratory system between specimens taken in Fukuoka and Omuta; however, no difference was found between those in O and T. The cytological study revealed bronchial epithelial cells, acidocytes, neutrocytes, and alveolar phagocytes. Cytological diagnosis seems to have the reproducibility necessary for epidemiological studies.

50223 **APTIC NO. 72364**

Ota, T., M. Goto, Y. Ryuraku, H. Une, T. Ogawa, and S. Goda

CONSIDERATION OF THE OFFICIAL RECOGNITION OF VICTIMS OF ENVIRONMENTAL POLLUTION, PART 1: ENVIRONMENTAL POLLUTION IN TOROKU. *(Higaishi nintei ni kansuru ichi kosatsu Dai 1-po. Toroku ni okeru kogai). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):178, April 1975.*

The Toroku area in Miyazaki Prefecture has been appointed for special consideration of air-pollution related health disturbance victims and 48 inhabitants were selected for compensation repeated medical examinations since 1971. The morbidities of subjective symptoms between a recognized group air pollution victims and an unrecognized group showed almost no difference. According to medical examinations, symptoms such as swelling of liver, decrease of sensation in the upper extremities, and decrease of sense of pain were very prevalent in both groups. Health problems in this area are due to arsenic, other elements, and sulfur dioxide; therefore, the presently used screening method for symptoms only due to arsenic is not appropriate.

50224 **APTIC NO. 71721**

Pal, Kalyani, Philip L. Grover, and Peter Sims

THE METABOLISM OF CARCINOGENIC POLYCYCLIC HYDROCARBONS BY TISSUES OF THE RESPIRATORY TRACT. *Biochem. Soc. Trans., no. 1975:174-175, 1975. 13 refs. (553rd Meeting, London.)*

The metabolism of the carcinogenic polycyclic hydrocarbons benzo(3-4)pyrene, benz(a)anthracene, and 7-methyl-benz(a)anthracene by Wistar rat and Syrian hamster trachea and by human bronchial tissue maintained in short-term culture was examined using radioactive labeling techniques. Both the animal tracheal rings and the human bronchial segments appeared to metabolize the three polycyclic hydrocarbons in a qualitatively and quantitatively similar manner. The site of metabolism within the tissues examined was not identified. The detection of dihydrodiols, which were formed as metabolites from polycyclic hydrocarbons by the respiratory tissues, appears to be relevant to hydrocarbon carcinogenesis.

50225 **APTIC NO. 72129**

Reznik-Schueller, Hildegard and Ulrich Mohr

INVESTIGATIONS ON THE CARCINOGENIC BURDEN BY AIR POLLUTION IN MAN XII. EARLY PATHOLOGICAL ALTERATIONS OF THE BRONCHIAL EPITHELIUM IN SYRIAN GOLDEN HAMSTERS AFTER INTRATRACHEAL INSTILLATION OF BENZO(A)PYRENE. 2. FURTHER ULTRASTRUCTURAL STUDIES. *Zentralbl. Bakteriol. Hyg., Infektionskr. Abt. Orig. B, 160(2):108-129, 1975. 15 refs.*

The ultrastructural alterations occurring in the bronchial epithelium of Syrian golden hamsters treated once weekly with 0.63 mg benzo(a)pyrene were examined during the first 20 wk of treatment. Epithelial cells penetrated the basement membrane finally forming small bronchogenic tumors (adenomata) composed of ciliated, nonciliated, and a few basal cells. No squamous metaplasia occurred.

50226 **APTIC NO. 72366**

Rokushika, T. and M. Aoyama

CHANGES IN COMPLAINTS OVER TIME FROM INHABITANTS OF AIR POLLUTED AREAS AND NON-POLLUTED AREAS IN NAGOYA CITY. *(Nagoya-shi no taikiosen chiku to hi-osen chiku ni okeru shuso no suii ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):155, April 1975.*

In Nagoya City, 2 areas of severe air pollution (A and B), a moderately polluted area (C), and 2 non-polluted areas (D and E) were chosen and complaints were surveyed by interview.

Population density in decreasing order from A-E was 136, 96, 255, 256 and 260, respectively. In 1970, the percentage of inhabitants claiming the existence of bad air was 88 and 78%, and in 1974, the percentages decreased to 78 and 78% in the A and B areas. In 1970, the frequency common colds highest in area A, followed by areas B and C; in 1974, however, the morbidity of A area decrdased while it did not in B and C. The concentration of sulfur dioxide in the air decreased annually in area A, but not in B. The change in complaints was proportional to air pollution levels in 1970-1973.

50227 **APTIC NO. 72130**

Schlipkoeter, H.-W., L. Ghelerter, and B. Ost

INVESTIGATIONS ON THE COMBINED EFFECT OF ZINC AND LEAD. *(Untersuchungen zur Kombinationswirkung von Zink und Blei). Text in German. Zentralbl. Bakteriol. Hyg., Infektionskr. Abt. Orig. B, 160(2):130-138, 1975. 17 refs.*

The effect of zinc and the combined effect of Zn and lead on mouse erythrocyte aminolevulinic acid dehydratase (Ala-D) were followed experimentally in vivo and in vitro. The Zn effect on Ala-D is a function of its concentration in the blood. Zinc chloride doses up to 500 micrograms/ml blood raise the activity of Ala-D, but higher doses lead to the suppression of the activity. Zinc exerts a dose dependent antagonistic effect on the suppression of Ala-D by lead. Possible explanations of these effects are discussed.

50228 **APTIC NO. 71674**

Taublee, D. B. and C. P. Yu

A THEORY OF AEROSOL DEPOSITION IN THE HUMAN RESPIRATORY TRACT. *J. Appl. Physiol., 38(1):77-85, Jan. 1975. 16 refs.*

A theory to preduct the particle deposition and its distribution in the human respiratory tract was developed for any breathing condition. The deposition of inhaled aerosol particles in the human respiratory tract is due to the mechanisms of inertial impaction, Brownian diffusion, and gravitational settling. A convection diffusion equation for the particle concentration with a loss of term used to describe the transport and deposition of particles. In this equation, an apparent diffusion coefficient due to the velocity dispersion in the lung is present and is the dominant diffusion mechanism for the cases considered. Expressions for deposition by various mechanisms are derived. The governing equation is solved numerically with Weibel s lung model A. The particle concentration at the mouth is calculated during washin and washout and compared favorably with experimental recordings for 0.5 micron diameter di(2-ethylhexyl)sebacate particles. The total deposition in the lung for particle sizes ranging from 0.05 to 5 micron is computed for a 500 cu cm tidal volume and 15 breaths/min. A particle size of minimum deposit deposition exists theoretically near 0.3 micron. (Author abstract modified)

50229 **APTIC NO. 72326**

Toyama, T.

ON THE OCCURRENCE OF ENVIRONMENTAL POLLUTION AND ITS POSSIBLE ALTERATION OF DISEASE. *(Kogai no hossei to shikkan no henka ni tsuite). Text in Japanese. Shinyaku to Chiryo (New Rem. Ther.), no. 193:9-10, Jan. 1975.*

Diseases due to occupational and environmental causes, especially nonspecific respiratory diseases, are described in relation to pollutants. The three kinds of officially recognized diseases due to environmental pollution, chronic bronchitis, bronchial asthma, and pulmonary emphysema, are difficult to ascribe to specific causes, even with the utilization of an epidemiological method of investigation. The multiple causal factors of environmental conditions and the quality of the host (human) must be considered in determining dose-response relationships, which are the basis of air quality standards for environmental pollutants.

50230 **APTIC NO. 72333**

Wakisaka, I.

EFFECTS OF COPPER NITRATE AEROSOL ON THE STIMULATING PROPERTY OF SULFUR DIOXIDE GAS. *(Aryusan gasu no shigekisei ni taisuru shosando eazoku no eikyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):163, April 1975.*

The synergistic effect of copper nitrate aerosols on the stimulation of the upper airway by sulfur dioxide gas was examined using the rate of decrease in respiration number of mice as an indicator. Decrease of respiration number was recognized only with exposure to the aerosol; a dose-response relationship between the rate of decrease and the concentration was in the range of 47 micrograms/l - 370 micrograms/l for 10 min of exposure. Following exposure to the aerosol, further exposure to 100 ppm of sulfur dioxide produced a rapid decrease in respiration number. The combined exposure to sulfur dioxide and the aerosol showed no different reactions than to single a exposure to sulfur dioxide; however, the reaction occurred very rapidly and the phenomenon of acclimatization occurred even more rapidly. The speed of reaction seems to depend on the catalytic role of the minute amount of copper ion in the process which stimulates the receptor on the upper airway by sulfur dioxide by oxidation.

50231 **APTIC NO. 72306**

American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio and American Industrial Hygiene Assoc., Akron, Ohio, Joint ACGIH-AIHA Aerosol Hazards Evaluation Committee

BACKGROUND DOCUMENTATION ON EVALUATION OF OCCUPATIONAL EXPOSURE TO AIRBORNE ASBESTOS. *Am. Ind. Hyg. Assoc. J., 1975:91-103, Feb. 1975. 96 refs.*

Background documentation for the occupational hazard associated with airborne asbestos exposure is presented along with a recommended sampling and assay method. Chronic exposure to asbestos can lead to asbestosis, with accompanying reductions in respiratory function. Bronchogenic carcinoma and mesothelioma of the pleura and peritoneum are also causally associated with asbestos exposures. The deposition of asbestos fibers in the lungs and bronchial passages depends on the diameter, length and shape of the asbestos fiber. Minimum fiber diameters range from 0.06 to 0.25 micron, while fiber lengths range from 0.2 to 1000 micron. A membrane filter-optical phase microscope sampling and identification method is proposed as the most suitable technique for minimizing errors in the estimation of threshold limit values.

1974

50232 **APTIC NO. 71700**

Andarzhanov, F. K., L. D. Nikolayeva, and L. M. Makar eva

PECULARITIES ON THE HEMOGRAMS AND CYTOCHEMICAL PARAMETERS OF THE PERIPHERAL BLOOD NEUTROPHILS IN CHILDREN LIVING IN AN AREA POLLUTED BY PETROCHEMICAL PLANT EMISSIONS. *(Osobennosti gemogrammy i tsitokhimicheskikh pokazateley neytrofilov perifericheskoy krovi detey, prozhivayushchikh v rayone vybrosov predpriyatiy neftekhimicheskoy promyshlennosti). Text in Russian. Gigiena i Sanit., no. 10:117-118, 1974.*

Hematological and cytochemical parameters of the peripheral blood were investigated in 254 healthy children living in an area affected by the emissions of a petrochemical plant and in 320 children living at a greater distance from the plant (control group). The hemoglobin level and the reticulocyte count were significantly higher in exposed children than in the control group; the color index was higher in preschoolchildren, and lower in school-age children than in the control. The erythrocyte count showed no marked differences. Reduction of the erythrocyte sedimentation reaction, reduced leukocyte count, and increased incidence of leukopenia were observed in school-age exposed children as compared with the control group. Considerable reduction of the thrombocyte count was observed in preschoolchildren. A significant reduction of the segmented- nuclei neutrophils in all exposed children except for the 2-year olds, reduction of the lymphocyte count in the latter, and increased lymphocyte count in older children were noted. An increased eosinophil count was found in all exposed children. Reduced functional activity of the neutrophils in the exposed children was confirmed by reduced glycogen, peroxidase, and lipid levels.

50233 **APTIC NO. 71933**

Berry, Wade L. and Arthur Wallace

TRACE ELEMENTS IN THE ENVIRONMENT - THEIR ROLE AND POTENTIAL TOXICITY AS RELATED TO FOSSIL FUELS - A PRELIMINARY STUDY. *California Univ., Los Angeles, Lab. of Nuclear Medicine and Radiation Biology, Atomic Energy Commission Contract AT (04-1) GEN 12, Rept. UCLA 12-946, 72p., Jan. 1974. 134 refs.*

The nature, occurrence, and effects of trace elements in the environment are reviewed along with the identification of probable hazards of trace element emissions to the environment, particularly as a result of fossil fuel power generation. The ecology of trace elements is very delicately balanced, and small additions of some trace elements from polluting sources can significantly alter an existing ecosystem. The pathways and rates of movement of trace elements between each component of any soil-water-plant- animal system are not well defined. Generally, the lower the concentration of a trace element in nature, the higher is its toxicity. Trace elements such as cadmium and mercury are known to occur in fossil fuels in somewhat higher concentrations than elsewhere, were making the study of their emission a matter of urgency. Elements such as zinc, copper, and cobalt which are essential for life at low concentrations can be toxic at higher concentrations. The trace element composition of fossil fuels is extremely variable, resulting in a great uncertainty regarding potential toxicity problems. The fate of volatile trace elements released from fossil fuels upon combustion is largely unknown, adding further to the uncertainty. This volatile group includes: antimony, arsenic, beryllium, bromine, cadmium, fluorine, gallium, mercury, and selenium; excluding antimony, bromine, and gallium, these pose a serious hazard to man. The nonvolatile trace elements of significant abundance in fossil fuels include: boron, chromium, cobalt, copper, iodine, lead, lithium, manganese, nickel, vanadium, and zinc. These afford a lesser, but still significant, hazard. Boron is certain to present soil-plant problems whenever coal ash is applied to soil.

50234 **APTIC NO. 72354**

Bloom, Harry, Ian Calder Lewis, and Ryutaro Kishimoto

A STUDY OF LEAD CONCENTRATIONS IN BLOOD OF CHILDREN (AND SOME ADULTS) OF SOUTHERN TASMANIA. *Med. J. Australia, 1974:275-279, Aug. 24, 1974. 35 refs.*

Blood lead analyses were performed on 201 subjects (mostly children) living in urban and nonurban areas of Southern Tasmania. Lead concentrations ranged from 8-34 micrograms/100 ml (mean 17.4 micrograms/100 ml) for urban subjects versus 12-25 micrograms/100 ml (mean 17.8 micrograms/100 ml) for suburban subjects. Children living in the areas of highest traffic density showed blood lead levels (18.0-19.6 micrograms/100 ml) approaching those of Los Angeles County residents living near freeways (22.7 micrograms/100 ml). The findings are consistent with the view that ingestion of lead compounds occurs principally by inhalation of aerosols. Motor traffic produces lead compounds which are in the form of fine aerosols and are less than 0.9 micron in mean diameter. The rate of ingested lead from urban air is cited as being 26 micrograms/day, and the rate of absorbed lead 20 micrograms/day. Although the blood lead concentrations of all subjects studied were below currently accepted toxic levels, approximately 8% were in the area of 25 micrograms/100 ml, the suggested danger level for children.

50235 **APTIC NO. 71517**

Briese, Franklin W., Miriam Orleans, and B. Charles Eversole

AN EPIDEMIOLOGIC STUDY OF CARBON MONOXIDE AND MORTALITY IN DENVER. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 3.3, p. 125-162. 14 refs.*

Air quality data, meteorological data, and death statistics were used to epidemiologically examine the relationship between carbon monoxide and mortality in Denver, Colorado. An association between increased mortality and high CO levels was found and persisted when days with extreme and normal temperatures were examined separately. Carbon monoxide also appeared to act synergistically with other pollutants such as ozone and nitric oxide. The average number of total deaths over age 64 were significantly higher on high CO days than on low CO days when oxidants were low. During days with high levels of both CO and oxidants, the number of deaths was higher for all age classifications except infants. The increases were statistically significant in the case of deaths from arteriosclerosis. Similar findings were observed for CO and nitric oxide combinations, with statistically significant increases in mortality from myocardial infarct being noted for the 50-64 yr age group when the concentrations of both constituents were high. No consistent patterns of mortality differences were associated with combinations of CO and particulate pollution.

50236 **APTIC NO. 71990**

Chapman, Robert, Victor Hasselblad, Carl Hayes, John Williams, Jon Simon, and Ruth White

VENTILATORY FUNCTION IN ELEMENTARY SCHOOLCHILDREN IN TWO SOUTHEASTERN CITIES, 1971-72. *Preprint, American Medical Assoc., Chicago, Ill., 23p., 1974. 12 refs. (Presented at the Air Pollution Medical Research Conference, San Francisco, Calif., Dec. 5-6, 1974.)*

A survey of ventilatory function of 7997 elementary schoolchildren in Charlotte, North Carolina and in Birmingham, Alabama was performed along with air quality sampling for total suspended particulates, respirable suspended particulates, suspended sulfates, suspended nitrates, and sulfur dioxide to assess the effect of suspended particulate pollution on ventilatory function. The cities were selected because they exhibited a gradient of exposure to suspended particulates and showed low levels of other pollutants. Mean age and height-adjusted 3/4 sec forced expiratory volumes in all age-, sex-, and race-specific subgroups were consistently lower in the more polluted city of Birmingham. Intercity differences in mean 3/4 sec forced expiratory volume were the smallest in the fall, greater in the winter, and greatest in the spring. Intercity differences in total suspended particulates, respirable suspended particulates, suspended sulfates, and suspended nitrates paralleled this pattern. Sulfur dioxide and suspended nitrates were present in low concentrations in both cities during the year of study and throughout the lives of the children; thus, it is unlikely that either of these pollutants exerted important deleterious effects on the ventilatory function studied. The specific particulate fraction or fractions exerting the strongest effects on 3/4 sec forced expiratory volume was not determined. (Author summary modified)

50237 **APTIC NO. 71518**

Clark, Richard, B. Charles Eversole, Carol Fox, and Miriam Orleans

ANNOTATED BIBLIOGRAPHY. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 4, p. 165-216. 131 refs.*

An annotated bibliography of 131 publications dealing with air pollution in terms of public attitudes, economic aspects, and epidemiological studies is presented. The sources listed are of particular relevance for the city of Denver, Colorado. The reported attitudinal research provides a bibliographic basis for intended community research in the Denver area, and the epidemiologic references place greater emphasis on carbon monoxide than on other pollutants. The references on economic consequences of air pollution are also selective.

50238 **APTIC NO. 71515**

Cobb, John C.

HEALTH EFFECTS OF CARBON MONOXIDE AND PHOTOCHEMICAL OXIDANT AIR POLLUTION IN DENVER. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 3.1, p. 97-119. 68 refs.*

High altitude exposure to carbon monoxide and photochemical oxidants in Denver, Colorado is discussed in terms of its effects on human health. Carbon monoxide and O3 levels sometimes found in streets of Denver are capable of causing heart symptoms and lung function impairment, particularly in older people with existing circulatory or respiratory problems. Chronic exposure, especially intermittent, may cause atherosclerosis and lead to premature aging. Exposure to CO and O3 during pregnancy may seriously injure the fetus and cause low birth weight, high neonatal mortality, and a high rate of spontaneous abortions. Although partial adaptation to a constant level of CO may occur after some weeks, sudden exposure to both high altitude and CO may seriously tax the cardiac reserve of some people. Adaptation resulting from exposure to low levels of O3 occurs fairly quickly in rodents, and such adaptation may also protect humans against some of the oxidant s effects. Vitamin C and other reducing substances help to protect against O3 effects. In addition to O3 and related oxidants, various drugs and conditions causing lethargy may accentuate the effects of CO. Localized deficiency of circulation in the brain may cause that area to be more susceptible to CO poisoning. (Author summary modified)

50239 **APTIC NO. 69403**

reasia, D. A.

EFFECT OF CHEMICAL PNEUMONIA ON RESPIRATORY CLEARANCE OF INHALED 51CR2O3. *In: Biology Division Annual Progress Report for Period Ending June 30, 1974. Oak Ridge National Lab., Tenn., Atomic Energy Commission Contract W-7405-eng-26, p. 173-174, Nov. 1974.*

NTIS: ORNL-4993

Pneumonia produced by infection affects pulmonary clearance. The effect of nitrogen dioxide-produced pneumonia on pulmonary clearance of (51)chromic oxide particles in the lungs of mice was tested. Mice exposed one time to a 30 ppm NO2 concentration showed no significant change in their pulmonary clearance rates. With a single exposure to 175 ppm, a marked retardation of particle clearance was observed. The biological half-life of (51)Cr2O3 under these conditions was approximately 50 days, while control animals showed an average biological half-life for (51)Cr2O3 of 12 days. This increase by four of the biological half-life could be extremely significant if the inhaled material was either a carcinogen, highly toxic, or highly radioactive. With NO2 exposure intermediate between 30 and 175 ppm, the effect, if any, on pulmonary clearance was marginal. If there was an effect, it appeared to be only in the early stages of particles clearance, up to about day 24, at which time the defect (?) was subject to reversal. Even with 10 daily exposures to 70 ppm, the results were essentially identical to those observed with a single exposure to 70 ppm NO2. Thus, it must be concluded that only very high NO2 concentrations will significantly affect pulmonary clearance of particles from the lungs of mice.

50240 **APTIC NO. 71516**

Cropp, G. J. A.

EFFECTS OF AIR POLLUTION ON HEALTH. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 3.2, p. 120-124.*

The effects of air pollution on human health are reviewed, with particular emphasis on people living in the Denver, Colorado area. Carbon monoxide, nitrogen oxides, and ozone are of especial concern in Denver. Carbon monoxide which interferes with oxygen transport is capable of causing cardiovascular problems and impairments of judgment and vision, particularly in susceptible individuals. The toxic effects of CO are magnified by the low oxygen levels resulting from Denver s high altitude. Nitrogen oxides result in immediate irritation of the eyes and respiratory passages, and prolonged exposures can result in progressive destruction and mechanical instability of the lungs. Ozone, another pollutant found in relatively high concentrations in Denver, also causes respiratory irritation and damage. Other pollutants such as sulfur oxides and particulates may either singly or in combination result in deterioration of respiratory function. Tobacco smoke is a dangerous source of both CO and particulates. Smokers have a greater chance of developing lung cancer, bronchitis, emphysema, and cardiovascular disease.

50241 **APTIC NO. 71989**

Davies, John E.

PESTICIDES EPIDEMIOLOGICAL FIELD STUDIES. *Miami Univ. School of Medicine, Fla., Environmental Protection Agency Contract 68-02-1145, Grant 802112, ROAP 21AYL, Program Element 1E1078 Rept. EPA-650/1-74-009, 50p., June 1974. 10 refs.*

NTIS: PB 237347/AS

Epidemiological studies of South Florida pesticide workers (aircraft pilots and loaders) subjected to mixed exposures of carbamate and organophosphate compounds were performed using multiresidue techniques. Aircraft loaders were receiving excessive pesticide exposure as evidenced by the occurrence of several acute pesticide intoxications, a chronic state of cholinesterase inhibition, and a high turnover in this category of work. Studies of urinary di-alkyl phosphates and phenols confirmed the excessive exposure of these two working groups. The amounts of diethyl phosphate, diethyl thiophosphate, dimethyl phosphate, dimethyl thiophosphate, and para-nitrophenol were significantly inversely correlated with the red blood cell cholinesterase. The four dialkyl phosphates were constantly indentified in these occupational exposures; and, following an 8-hour exposure to single organophosphate, both the dialkyl phosphates and appropriate phenolic derivatives persisted in the urine for 36 hr or longer. More protracted illnesses were observed following acute exposure to certain halogenated organophosphates, especially dichlorophenol diethyl phosphorothioate. The presence of the halogen constituents attached to the phosphate moiety resulted in the delayed occurrence of acute intoxication and a protracted clinical crisis. Air samplings reinforced the greater use of organophosphates in South Florida.

50242 **APTIC NO. 75103**

Deichmann, W. B.

STUDY OF THE ECOLOGY OF PESTICIDES (FINAL REPORT). *Miami Univ., Coral Gables, Fla., Research and Teaching Center of Toxicology, Environmental Protection Agency Grant R801470, Program Element 1E1078, Task 54, ROAP 21AFM, Rept. EPA-650/1-74-012, 57p., Oct. 1974. 11 refs.*

NTIS: PB 240173/AS

Three series of experiments dealing with the effects of pesticides on laboratory mice and rats are reviewed. Experiments investigating the carcinogenicity of prolonged dieldrin feeding to mice showed a decreased number of malignant tumors in male and female mice with decreased dieldrin levels (3 ppm and 10 ppm). The number of male and female mice showing benign tumors was essentially the same for 163 control mice, 159 mice fed dieldrin at 3 ppm, and 161 mice given 10 ppm of dieldrin. In females fed 10 ppm, however, the ovaries and mammary and subcutaneous tissues showed an increased incidence of neoplastic lesions over those observed in controls and mice receiving 3 ppm of the pesticide. Experiments involving the effects of feeding aldrin and dieldrin on tumor incidence in albino rats indicated that neither pesticide in dosages of 20-50 ppm is carcinogenic or tumorigenic when fed for a lifetime to weanling male and female Osborne-Mendel and Sprague Dawley rats. A seven-generation study on the retention of dieldrin and DDT in mice tissues (Swiss- Webster mice) revealed markedly elevated body pesticide retention and concentration in the total body lipids after the second generation. The levels of aldrin given were 5 and 10 ppm, while DDT was administered at 100 ppm. Conception was frequently delayed from 3-4 wk from the third generation on.

50243 **APTIC NO. 71937**

Fairchild, Glen A., S. Stultz, and D. L. Coffin

SULFURIC ACID EFFECT ON THE DEPOSITION OF RADIOACTIVE AEROSOL IN THE RESPIRATORY TRACT OF GUINEA PIGS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 24p., 1974. 23 refs.*

The effects of sulfuric acid aerosol inhalation on the respiratory deposition of radiolabeled streptococcus aerosol was investigated in female Hartley strain guinea pigs. A 60-minute exposure to 3020 micrograms/cu m H2SO4 (1.8 micron) resulted in a 60% greater total respiratory deposition rate than that for controls not receiving H2SO4 treatment prior to streptococcus aerosol inhalation. A proximal shift in the regional pattern of deposition to the nasopharynx was also observed in the animals pretreated with H2SO4 aerosol. Dose-response experiments demonstrated that a concentration of 30 micrograms/cu m H2SO4 aerosol (0.25 micron) also resulted in a proximal shift in the regional pattern of particle deposition, with the shift being to the trachea in this instance. Based on experiments by other investigators involving H2SO4 exposures and pulmonary airflow resistance measurements in guinea pigs, it is presumed that increased airflow resistance was experienced by the guinea pigs showing changes in respiratory deposition in response to H2SO4 aerosol. Relatively low concentrations of H2SO4 appear capable of inducing alterations in normal host response to inhaled particles which may be deleterious to health.

50244 **APTIC NO. 72077**

Fitschen, W.

PROTEIN SYNTHESIS OF MONKEY LUNG SUBCELLULAR FRACTIONS AFTER EXPOSURE TO SILICA IN VIVO. *Experientia, 30(12):1378-1379, Dec. 15, 1974. 9 refs.*

Changes in protein biosynthesis by subcellular components (rough membrane and ribosomes) of the monkey lung after administration of silica in vivo are reported. Twenty vervet monkeys were each injected intratracheally with a suspension of 250 mg silica. The monkeys were sacrificed 4-6 mo later. There was a marked decrease of protein synthesizing activity of both subcellular fractions after 4 mo. The differences in activity from control cannot be ascribed to a difference of the soluble factors in cell sap or pH 5 enzyme fractions as they show similar effects whether derived from control or silica-treated lungs. No significant changes were noted 6 mo after injection.

50245 **APTIC NO. 72164**

Gilmore, Timothy M. and Thomas R. Hanna

THE NEED FOR REPRESENTATIVE AMBIENT AIR CO SAMPLING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 7p., 1974. 21 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Conference, Boise, Idaho, Nov. 17-19, 1974, Paper 74-AP-02.)*

Representative ambient air monitoring of carbon monoxide is discussed in relation to predicting population exposure to the pollutant. A review of various urban studies concerning CO exposure reveals no significant correlation between median population carboxyhemoglobin levels and the calculated rollback of CO concentrations. The use of a trend analysis in calculating necessary CO reductions, however, resulted in good correlation with median COHb levels for five cities. If, as one urban study suggests, the population levels of COHb are more related to place of employment than ambient CO levels measured at monitoring sites, then a re-evaluation of the controls necessary to make reductions in population COHb burden is needed.

50246 **APTIC NO. 71740**

Gloor, M.m H. Josephs, and H. C. Friederich

THE INFLUENCE OF AIR POLLUTION ON THE PARAFFIN CONTENT OF THE SKIN SURFACE LIPIDS. *(Ueber den Einfluss der Luftverschmutzung auf den Paraffingehalt der Hautoberflaechenlipide). Text in German. Arch. Dermatol. Forsch., vol. 250:277-284, 1974. 35 refs.*

Paraffin content of the skin surface lipids was determined for persons exposed to various levels of air pollution (fumes) during both wet and dry weather periods. The paraffin content was significantly higher for high fume exposures during dry weather conditions than for reduced fume exposure coupled with wet weather. The increased amounts of paraffins detected on the skin appeared to be precipitated from the pollution air.

50247 **APTIC NO. 68026**

Gofmekler, V. A.

EMBRYOTROPIC ACTION OF CHEMICAL ATMOSPHERIC POLLUTION. *(Embriotropnoye deystviye khimicheskikh zagryazneniy atmosfernogo vozdukha). Text in Russian. Gigiena i Sanit., no. 9:7-10, 1974. 26 refs.*

The embryotropic action of inhaled benzene, formaldehyde, dimethylformamide, diethylamine, hexane, methylmercaptophos, trichlorfon, butyphos, and chloroprene was studied in pregnant albino rats and their fetuses. The rats were exposed to these substances in concentrations equaling or higher than their maximum allowable daily concentrations in the air continuously throughout their pregnancy. Regardless of their concentration and possible teratogenicity, all substances caused similar changes in the maternal and embryonal organisms, such as increased intrauterine mortality, reduced fertility, changes in the weight and size of the embryos, hemorrhages under the skin and in organs and body cavities, anomalies in the ossification of the skeleton, pathomorphological histochemical changes in the uterus and placenta, and disturbances in the ascorbic acid balance in the maternal organism, placenta, and embryo. Sporadic malformations were of spontaneous nature. The changes were nonspecific and sinusoidal as a function of the concentration inhaled. The possible extrapolation of the data to the human organism is being studied.

50248 **APTIC NO. 72016**

Hammer, D. I., F. J. Miller, A. G. Stead, and C. G. Hayes

AIR POLLUTION AND CHILDHOOD LOWER RESPIRATORY DISEASE: EXPOSURE TO SULFUR OXIDES AND PARTICULATE MATTER IN NEW YORK, 1972. *Preprint, American Medical Assoc., Chicago, Ill., 19p., 1974. 28 refs. (Presented at the Air Pollution Mecial Research Conference, San Francisco, Calif., Dec. 5-6, 1974.)*

Acute lower respiratory disease in children aged 1-12 yr was surveyed retrospectively by questionnaire among parents in four New York metropolitan communities representing different exposures to sulfur dioxide, particulate matter, and suspended sulfates. Rates of any lower respiratory disease (croup, bronchitis, and other chest infections) were significantly higher among both black and white children residing in the higher pollution exposure communities. The relative increases in black children ranged from about 1.7 per one or more episodes of any lower respiratory diseases to about 3.2 for one or more epidsodes of other chest infections. Among white children, the increases ranged from about 1.1 for one or more epsiodes of croup to about 1.5 for one or more episodes of other chest infections. Differences in family size and composition, crowding, parental cigarette smoking, or indoor air pollution from gas stoves or space heaters did not account for the morbidity excesses in the high exposure communities. The best judgement estimate of the average annual pollutant concentrations associated with excess childhood respirarory morbidity in this study was 175-250 micrograms/cu m of SO2, 85-110 micrograms/cu m of total suspended particulates, and 13-14 micrograms/cu m of suspended sulfates. (Abstract summary modified)

50249 **APTIC NO. 71950**

Held, Bruce J., William H. Revoir, John A. Pritchard, Alan A. Hack, Louis A. Geoffrion, Thomas O. Davis, Philip L. Lowry, Charles P. Richards, Lloyd D. Wheat, and Edwin C. Hyatt

RESPIRATOR STUDIES FOR THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (PROGRESS REPORT). *Los Alamos Scientific Lab., N. Mex., Respirator Research and Development Section, National Inst. for Occupational Safety and Health Proj. R072, Rept. UC-41, 43p., Dec. 1974. 17 refs.*

NTIS: LA-5805-PR; GPO

Research in the field of respiratory protection centering on the development of test equipment or methods and towards establishing improved respirator performance criteria is summarized. Specific studies include: Model I sodium chloride aerosol system; impactor calibration; respirator exhalation valve test system; head harness strap tension test system; facepiece to face pressure measuring system; anthropometrically selected test panels for quantitative respirator-man testing; quantitative overall performance of new single-use valveless dust respirators; respirator filter efficiency for steady air flow and cyclic air flow; dust-mist filter studies; and fume filter studies. Recommendations were made for the establishment of performance criteria for dust-mist respirators filters and for fume respirator filters pertaining to initial penetration by sodium NaCl aerosol particles and pertaining to NaCl aerosol particle penetration after exposure of the filters to highly humid air.

50250 **APTIC NO. 71628**

Hofmann, H. T. and H. Sand

FURTHER STUDIES ON THE RELATIVE TOXICITY OF THE PYROLYSIS PRODUCTS OF PLASTIC MATERIALS. *(Weitere Untersuchungen zur relativen Toxizitaet von Kunststoff-Verschwelungsproducten). Text in German. Kunstst. Rundsch., 21(10):413-416, Oct. 1974. 6 refs.*

The toxicity of inhaled gases generated by smoldering plastic materials was studied in rats. Using a 5-gram sample in a 100-liter chamber, pyrolysis was conducted at 300, 400, 500, and 600 C, after which the pyrolysis gases were diluted with air in ratios of 1:2, 1:5, and 1:10. Pyrolysis gases of polyurethane resin with flame-retardant caused 100% mortality at 1:10, whereas similar dilutions of gases generated by polyvinyl chloride and pinewood were not toxic. The mortality observed following inhalation of PVC pyrolysis gases was due to hydrochloric acid. Pyrolysis gases of polyethylene contained 100 to 1000 ppm carbon monoxide but no other toxic component. Polyurethane foam (PUR 1) generated less toxic pyrolysis gases than leather and felt at 300-400 C, but there was no difference in the toxicity at 500-600 C. The mortality was due to high hydrocyanic acid concentrations in the pyrolysis gases. Polyurethane foam PUR 2 with a halogen-based flame retardant generated pyrolysis gases whose toxicity was largely the same as that of waste gases of natural products, while the pyrolysis gases generated by this plastic at 500 and 600 C were of reduced toxicity. Poisoning hazards of the waste gases of smoldering plastic materials are not greater than those of gases generated by conventional materials.

50251 **APTIC NO. 71905**

Hurlbut, Jeffrey A.

THE HISTORY, USES, OCCURRENCES, ANALYTICAL CHEMISTRY, AND BIOCHEMISTRY OF BERYLLIUM--A REVIEW. *Dow Chemical Co., Golden, Colo., Environmental Science and Waste Control Atomic Energy Commission Contract AT(29-1)-1106, Health and Safety Rept. UC-41, TID-4500-R62, 28p. Dec. 16, 1974. 318 refs.*

NTIS: RFP-2152

The toxicity and analysis of beryllium are reviewed. Acute Be disease occurs at an atmospheric concentration of Be compounds in excess of 100 micrograms of Be/cu m. If the air level should exceed 100 micrograms of Be/cu m, morbidity of acute symptomatology would be nearly total for the exposed population. Beryllium affects the skin and the respiratory system. Exposure limits were set in 1949 by the Atomic Energy Commission at 2 micrograms/cu m for an 8-hour period. No one can be exposed to atmospheric concentrations greater than 25 micrograms/cu m and the average monthly neighborhood atmospheric concentration cannot exceed 0.01 micrograms/cu m. The American Industrial Hygiene Association indicates a 50 milligrams/cu m atmospheric concentration for 6 hr is immediately hazadous to life. Analytical techniques include: ashing, separation, gravimetric, volumetric, spectrophotometric fluorometric, emission, activation, gas chromatographic, atomic absorption, and polarographic methods. A literature survey of 318 references resulting from an unsuccessfu attempt to uncover a Be exposure bioassay is included. (Author abstract modified)

50252 **APTIC NO. 71729**

Ichihara, M.

A CONSIDERATION ON THE EVALUATION OF LEAD IN AIR AS LIVING ENVIRONMENT. *(Seikatsu-kankyo to shiteno taikichu namari nodo no hyoka ni kansuru ichi kosatsu). Text in Japanese. Yokohama Igaku (Yokohama Med. J.), 24(5/6):206, March 1974.*

Medical examinations were made on 1368 inhabitants living around a glass factory with a history of 12 working years to examine the effects of air pollution by lead. The examination included screening and detailed examination, but on personal examination, no evidence of lead poisoning was found. Hematological examination of 232 inhabitants showed only physiological variation concerning sex and age without relationship to environmental factors. Concentrations in the blood lead and urine coproporphyrin and lead showed no significant difference among sex, distance from the factory, age, length of residence, and occupation. The concentration of lead in the air around the factory up to a distance of 150 m fluctuated within 1.4 - 14.8 micrograms/cu m. Exposure to lead in air at 12 - 15 micrograms/cu m for 12 yr could not cause an abnormal increase of lead concentration in blood and urine or urine coproporphyrin.

50253 **APTIC NO. 72368**

Ikeda, Y.

RECENT TOPICS ON PHOTOCHEMICAL SMOG. *(Kokagaku smog saikin no wadai). Text in Japanese. Tokyo-to Yakuzaishikai Shi (J. Tokyo Met. Assoc. Pharm.), no. 112:44, July 1974.*

The characteristic effects of photochemical smog on humans include increased morbidity on sunny days, more pronounced susceptibility of females, synergistic effects with exercise, and a wide range of personal toxic tolerances. Photochemical smog forms near the soil surface from accumulated nitrogen oxides by irradiation with ultraviolet light. Ozone, floating dust, olfins, and cyclic hydrocarbons in auto exhaust, peroxyacetyl nitrate, and other unknown factors also can constitute photochemical smog and affect the airway.

50254 **APTIC NO. 71692**

Imai, M.

ASTHMA DUE TO ENVIRONMENTAL POLLUTION SEEN FROM THE STANDPOINT OF PUBLIC HEALTH. *(Koshu eisei no tachiba kara mita zensoku, kogaibyo to shite no zensoku). Text in Japanese. Medicina (Medecine) (Japan), 11(12):1520-1521, Dec. 1974. 4 refs.*

The relationship between air pollution and bronchial asthma was examined by an epidemiological survey in Yokkaichi with particular emphasis on the etiology and exacerbation. The frequency of asthmatic occurrence began to increase with the increase of air pollution in 1960 and it began to decrease slowly with the decrease of pollution, confirming the rate of air pollution in bronchial asthma etiology. The frequency of asthmatic attacks is doubled when sulfur dioxide concentrations were higher than 0.1 ppm on a weekly average. There is a high correlation of +0.88 between the degree of air pollution and the frequency of asthmatic paroxysm, confirming aggravation of the disease state by air pollution. Mortality due to bronchial asthma also depends on the air pollution level.

50255 **APTIC NO. 71706**

Katsnel son, B. A.

CERTAIN ASPECTS OF THE HYGIENIC ASSESSMENT OF THE COMBINED EFFECT OF SMOKING AND AIR POLLUTION ON THE ORGANISM. *(Nekotoryye aspekty gigiyenicheskoy otsenki kombinirovannogo vliyaniya kureniya i vozdushnykh zagryazneniy na organizm). Text in Russian. Gigiena i Sanit., no. 9:62-66, 1974. 37 refs.*

Studies on the combined effect of smoking and air pollution in open air and in workplaces are reviewed for the hygienic assessment of the two different factors. The contribution of polycyclic aromatic hydrocarbons inhaled during smoking to lung cancer may be equivalent to, and even surpass, the contribution of such compounds inhaled in polluted city air. Heavy smoking effaces even statistically significant differences in the incidence of lung cancer between areas with high and low air pollution levels. Lung cancer mortality increases more rapidly with the number of cigarettes smoked in areas with low pollution than in areas with high pollution level. Epidemiological studies in lung cancer mortality among smoking and non-smoking asbestos workers revealed potentiation of the carcinogenic effect of benzopyrene present in cigarette smoke by asbestos dust. Many irritating pollutants, such as sulfur dioxide, sensitize the bronchial mucosa to the carcinogenic effect of polycyclic aromatic hydrocarbons. Epidemiological studies revealed that silicogenic industrial dusts potentiate the effect of cigarette smoke carcinogens by facilitating the retention of the letter. High dust concentrations may reduce and even fully eliminate the significant differences in the incidence of chronic bronchitis among smokers and non-smokers.

50256 **APTIC NO. 72271**

Kuehne, W.

ADVANCES IN THE PATHOLOGY OF RESPIRATORY DISEASES CAUSED BY NOXIOUS AGENTS. *(Fortschritte in der Pathologie von Schadstoffeinwirkungen auf die Atmungsorgane). Text in German. Z. Erkrankungen Atmungsorgane, 141(1):18-23, 1974. 20 refs.*

Various types of pneumoconioses are discussed in relation to dust inhalation. In addition to the specific nodular fibrosis occurring during silicosis, nonspecific respiratory damage (chronic bronchitis and emphysema) caused by pollutant other than silicates appears capable of influencing the functional capacity during silicosis. The long-term inhalation of high enough concentrations of non-toxic dust that is quartz-free can result in reductions in function capacity similar to those observed during silicosis.

50257 **APTIC NO. 71716**

Laszt, L. and R. Schaad

ACUTE EFFECT OF SULFUR DIOXIDE ON THE CIRCULATION IN ANIMALS, AS WELL AS ON THE CONTRACTILITY OF ISOLATED BLOOD VESSELS. *(Akuter Einfluss von Schwefeldioxid auf den Kreislauf von Tieren Sowie auf die Kontraktilitaet isolierter Blutgefaesse). Text in German. Atmos. Environ., 8(10):1049-1059, Oct. 1974. 21 refs.*

Exposure experiments with cats and dogs were conducted to study the acute effects of sulfur dioxide inhalation on circulation. Inhalation of SO2 at concentrations of up to 1000 ppm over 30-minute intervals caused no circulatory reaction. Larger doses, however, did result in circulatory reactions, with the action of SO2 on systemic and pulmonary circulation being different. Differences were also observed for the contractility of corresponding isolated vessels.

50258 **APTIC NO. 75104**

Lunan, Kenneth D.

USE OF LEUCOCYTE METABOLISM AS A HEALTH EFFECTS INDICATOR (FINAL REPORT). *Stanford Research Inst., Menlo Park, Calif., Environmental Protection Agency Contract 68-02-0713, Program Element 1A1005, ROAP 21AYB-66, Rept. ISU-2430, EPA-650/1-74-013, 103p., April 1974. 40 refs.*

NTIS: PB 240174/AS

Leucocytes were evaluated as a responsive bioindicator of lead, cadmium, and platinum intoxication in rabbits. Adult rabbits were injected intraperitoneally with cadmium chloride, lead acetate, and saline daily for 1 or 3 weeks, and the maximum permissible dosages were established during toxicity studies. Leucocytes were isolated by density gradient centrifugation and examined for their ability to synthesize deoxyribonucleic acid, ribonucleic acid, protein, and phospholipid as well as their ability to catabolize protein and phospholipid. Rabbit leucocytes were also treated in vitro with sodium hexachloroplatinate, with the same metabolic capabilities being assessed. Lead and cadmium treatments produced a mild anemia, though the white cells were only slightly affected. One-week cadmium treatments and 3-week lead and cadmium treatments depressed the synthesis of both nucleic acids, while the synthesis and degradation of protein and phospholipid were unaffected by the metal treatments. Luecocytes from 3-week control rabbits synthesized for four classes of biomolecules at a faster rate than leucocytes from 1-week control rabbits. Nucleic acid and protein synthesis were depressed in leucocytes treated with the platinum salt in vitro, though phospholipid synthesis was unaffected. Thus, leucocytes appear to be capable of serving as a responsive bioindicator of trace metal contamination. (Author abstract modified)

50259 **APTIC NO. 71935**

Mayer, R. A., W. L. Prehn, Jr., and D. E. Johnson

A LITERATURE SEARCH AND ANALYSIS OF INFORMATION REGARDING SOURCES, USES, PRODUCTION, CONSUMPTION, REPORTED MEDICAL CASES, AND TOXICOLOGY OF PLATINUM AND PALLADIUM. *Southwest Research Inst., San Antonio, Tex., Environmental Protection Agency Contract 68-02-1274, Program Element 1AA002, ROAP 26AAE, Rept. SWRI 013881, EPA-650/1-74-008, 46p., April 1974. 42 refs.*

NTIS: PB 238546/AS

Results from a literature search regarding sources, uses, production, consumption, reported medical cases, and toxicology of platinum and palladium are reported. An average of

3.7 million troy ounces of platinum and palladium were produced in the world in the 1969-1972 period, with the United States consuming about a third of this. The introduction of a new demand for automotive emission control catalyst purposes (18% of the total supply in 1980 and 15% in 1990) is not expected to upset the world supply/demand situation, although this assumption does not consider the possibility of other countries adopting the catalytic muffler. Essentially no data exist on industrial rates of transfer of platinum and palladium to the environment, although mining, processing, and refining operations along with firms engaged in the preparation, regeneration, and recovery of platinum and palladium catalysts have the potential for losses that are of health concern. Occupational exposures among refinery workers to complex salts of platinum have produced such symptoms as asthma, eczematous lesions, and dermatitis. Exposure to metallic platinum or palladium or the complex salts of palladium apparently do not produce such effects. Thus, only the complex salts of platinum appear to be toxic. Laboratory tests with animals, however, show that certain palladium salts can produce damage to the heart, kidneys, liver, and bone marrow.

50260 **APTIC NO. 72162**

Meyer, George W.

ENVIRONMENTAL RESPIRATORY DISEASE (TOKYO-YOKOHAMA ASTHMA): (THE CASE FOR ALLERGY). *[redacted]P)([redacted] (?). 19 refs.*

Attack rates, immunological studies, and clinical features are reviewed for American patients who developed asthma in the Tokyo- Yokohama area of Japan in order to demonstrate that the disease is an allergic reaction to something in that particular area. Most patients developed their symptoms within the first 15 mo after arrival in Japan, and patients usually experienced dramatic symptomatic improvement upon departing from the area. Soluble aerosols and dust levels correlated with increased attack rates during the October-March period when significant eosinophilia was documented in up to 84% of the affected patients. Thus environmental dust appears to be causing an allergic response. Many patients with asthma also showed an immediate skin test reaction to an extract of a coarse dust obtained from the area.

50261 **APTIC NO. 71625**

Mizoguchi, I., K. Makino, Y. Sato, S. Osawa, M. Fukuda, and H. Yagyu

ON THE SURVEY OF SUBJECTIVE SYMPTOMS CONCERNING PHOTOCHEMICAL SMOG: PART II. THE CHANGE OF SUBJECTIVE SYMPTOMS DURING A YEAR. *(Kogagaku sumoggu ni kansuru jikakusho chosa ni tsuite dai 2ho. nenkan no jikakusho henka). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10)Suppl.:431, Oct. 1974. (Presented at the Japanese Society of Public Health, Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974.)*

The onset of diseases due to photochemical smog during a year, and their relationship to specific pollutants were examined from July 1972 to June 1973. The symptoms adopted here are: pain in eyes, lachrymation, pain in throat, cough, sputum, gasp, languidness, headache, numbness, dizziness, convulsion, nausea, obstructive coryza, hyperpituita, dysosmia, feeling of pyrexia, and feeling sick. Correlation between the subjective symptoms and pollutants examined monthly has shown that the concentration of oxidants and sulfur oxides showed deeper effects on the subjective symptoms; however, that of SOx did not necessarily show effects throughout the year.

50262 **APTIC NO. 71732**

Mukai, I.

INVESTIGATION OF DAMAGES DUE TO AUTOEXHAUST PART I. LOCAL AND ROADSIDE COMPARISON. *(Jidosha haiki gasu higai chosa - dai ippo chiiki betsu oyobi doro ensen betsu hikaku). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10)Suppl.: 435, Oct. 1974. (Presented at the Japanese Society of Public Health, Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974.)*

Considering that not only the noise of automobiles but also the exhaust gases might affect human health conditions, the subjective symptoms of inhabitants in Tsuchiura City were collected in August 1971, the inhabitants being divided into noisy area (I), not-noisy area(II), heavy traffic area (A), and light traffic area (B), and those having histories and present symptoms of disease of eyes, ears, nose, and respiratory and circulatory system being omitted. When the symptoms were divided into five kinds, there was a difference between (I) and (II) in each kind, and, except for sleep disturbance, all the frequencies of four kinds of subjective symptoms were larger in (II) and (I), suggesting the hindrance of subjective symptoms due to accustomedness. There was a difference between (A) and (B) in all five kinds of subjective symptoms, and the frequencies of these symptom groups was larger in A than in B. It is concluded that there are effects on human health due to auto exhaust.

50263 **APTIC NO. 71861**

Port, Curtis D., David L. Coffin, Phillip Kane, and Kathleen V. Ketels

THE SURFACE MORPHOLOGY AND ALVEOLAR PORE NUMBER OF NORMAL AND EMPHYSEMATOUS MAMMALIAN LUNGS. *Preprint, IIT Research Inst., Chicago, Ill., Life Sciences Div., and Environmental Protection Agency, Research Triangle Park, N. C., National Environemental Research Center, 54p., 1974 (?). 27 refs.*

The morphologies of lungs of laboratory animals with experimentally induced emphysema were compared by light and scanning electron microscopy to those of a spontaneous emphysema in the horse and human. Under light, microscopy, the lungs from the nitrogen dioxide-exposed rat had an irregular alveolar pattern and showed alveolar distention, attenuation, and occasional thickening of alveolar walls. The hamster lungs had an irregualr pattern, but the centrolobular airspaces appeared dilated, with more peripheral alveoli appearing to be normal. Little change was observed in the mouse lung. The human lung had mild panlobular emphysema, most prominent adjacent to bronchioles. The structure of the horse lung was extremely distorted with numerous broken or lost alveolar septae, coalesced alveoli, and some large bullous pockets, and trabecular strands. The results obtained by scanning electron microscopy could be correlated with those seen by the light microscope. Because of the variability in pore size and number of per alveolus, a pore-to-alveolus ratio was determined on the normal lung of each of the species examined and is tabulated.

50264 **APTIC NO. 71639**

Rosmanith, Jindrich

THE EFFECT OF CANA2 EDTA ON THE RETENTION OF ZINC OXIDE IN ANIMAL ORGANISMS. *(Die Wirkung von CaNa2EDTA auf die Retention von Zinkoxid im Tierorganismus). Text in German. Staub, Reinhaltung Luft, 34(11):410-413, Nov. 1974. 49 refs.*

The simultaneous application of calcium disodium ethylenediaminetetraacetic acid intramuscularly and a single intratracheal zinc oxide application in rats leads to a change in the time of increase in wet and dry lung weights and at the same time, to a slowing down of zinc elimination from lung and kidney. These findings are discussed on the basis of similar experiments found in the literature. For the experiments three groups of Wistar rats were used. The first group of 50 female rats received 15 mg ZnO suspended in 0.5 ml physiological sodium chloride solution. The second group of 50 rats received, in addition to the single intratracheal application of 15 mg ZnO, 1 ml of a 10% CaNa2EDTA solution twice a week. The third group of 50 rats was used as control group.

50265 **APTIC NO. 72083**

Sadilova, M. S., V. A. Kostyuchenko, E. G. Plotko, S. I. Voroshilin, V. Y. Nikiforova, and E. N. Pochashev

THE PROBLEM OF AGE SENSITIVITY OF THE BODY TO FLUORINE IONS IN THE AIR. *(K voprosu o vozrastnoy chuvstvitel nosti organizma k ionu ftora v vozdukhe). Text in Russian. Gigiena i Sanit., no. 12:33-36, Dec. 1974. 4 refs.*

The age-dependent sensitivity of the organism to inhaled fluorine was studied in rats. The animals were most susceptible to fluorine at the age of 1.2 to 3.9 mo and again at the age of 11.6-23.6 mo. In the first case, damage of the dental enamel, and lesions of the respiratory tract were most pronounced, while in the second age bracket animals were affected by lesions of the bones, lungs, and upper respiratory tract. Proliferation in the interalveolar septa, atrophy and focal edema of the bronchial mucosa, and hyperplasia of the peribronchial tissue were found on autopsy. The above age brackets correspond to those of 1-14 yr and 26-55 yr in humans.

50266 **APTIC NO. 72199**

Saric, M., Slavica Lucic-Palaic, Ranka Paukovic, and Ankica Holetic

RESPIRATORY EFFECTS OF MANGANESE. *(Djelovanje mangana na respiratorni sistem). Text in Serbo-Croatian. Arhw. Hig. Rada, 25(1):15-26, 1974. 9 refs.*

Epidemiological studies concerning the effects of manganese on the human respiratory system were conducted on various groups of occupationally and non-occupationally exposed adults and a group of schoolchildren. Workers occupationally exposed to the metal showed a higher rate of respiratory symptoms than adults exposed to ambient levels. With only one exception, no relationship was observed between 3/4 min forced expiratory volume values of schoolchildren and manganese levels measured in the vicinity of the school.

50267 **APTIC NO. 71638**

Schittke, Hans-Joerg and Hans Zorn

DIGITAL SIMULATION OF INHALATION OF A CO/AIR MIXTURE BY THE SYSTEM LUNG/BODY. *(Digitale Simulation der Einatmung eines CO-Luftgemisches durch das System Lunge/Koerper). Text in German. Staub, Reinhaltung Luft, 34(11):405-409, Nov. 1974. 19 refs.*

A mathematical model was developed simulating the pathophysiological phenomena connected with the inhalation of a carbon monxide/air mixture. The model allows the digital computer analysis of the dynamics of the CO concentration in blood and tissue when the CO partial pressure of the surrounding air is given. A mathematical model consisting of four coupled differential equations is given approximating the actual mechanism of inhalation, including the physicochemical process of carboxyhemoglobin production by means of nonlinear charactristics. Identification of unknown or inaccurate parameters was made by means of an optimization method based on the evolution principle. The resulting model shows very good agreeemnt with the data of a series of experimental tests. The dynamics of the inhalation of air with a partial pressure of 50 ppm CO was investigated. The resulting dominant time constant was approximately 210 min.

50268 **APTIC NO. 72269**

Swiatczak, Janusz and Aleksandra Olejnik

ACUTE EXACERBATIONS AND DEATHS IN THE GROUP OF RESPIRATORY DISEASES AND CARDIOVASCULAR DISEASES IN THE CITY OF LODZ IN RELATION TO ATMOSPHERIC POLLUTION. *(Wystepowanie ostrych stanow i zgonow w grupach schorzen drog oddechowych i ukladu krazenia na terenie Lodzi w zaleznosci od poziomu zanieczyszczenia powietrza atmosferycznego). Text in Polish. Roczniki Panstwowego Zakladu Higi., 25(6):613-618, 1974. 5 refs.*

The effect of air pollution episodes (sulfur dioxide and dust) on the morbidity and mortality of a group of people suffering from upper respiratory disease and cardiovascular disease was studied by examining air monitoring data and health statistics (ambulance service records and death certificates) for the city of Lodz. During the month of January in 1971, when the atmospheric pollution reached a 7-year peak, ambulance station statistics revealed the incidence of acute cardiovascular and respiratory diseases to be at a maximum. The number of deaths from these diseases reached a maximum of 18 on the first day of the episode; on subsequent days, however, the mortalities returned to average.

50269 **APTIC NO. 71646**

Tomita, S., K. Kamikubo, A. Usakami, and M. Mashiko

RESULTS OF EXAMINATION OF BRONCHIAL ASTHMA OF SCHOOLCHILDREN IN IBARAGI PREFECTURE: CLINICAL CONSIDERATION OF THE RESULTS. *(Ibaragi-ken ka gakudo ni okeru kikanshi-zensoku no jittai chosa seiseki to sono rinshoteki kosatsu). Text in Japanese. Shonika Shinryo (J. Pediat. Pract.), 37(12): 1446-1458, Dec. 1974. 22 refs.*

In 18 selected primary and middle schools in Ibaragi Prefecture 8209 children were screened by questionnaire on bronchial asthma, and those having asthmatic symptoms and history (139) were examined in detail. The frequency in primary schoolchildren was 1.57% and that in secondary schoolchildren was 0.6%, both of which are relatively higher than the values hitherto obtained. The morbidity of bronchial asthma of both middle and primary schoolchildren was generally higher in towns in industrial areas. The disease state was generally lighter. The higher morbidity of cases in rural areas suggests that the dusty living environment in modern closed residences accentuated the airway sensitization on hypersensitive children to develop asthmatic symptoms. Preventive measures are described.

50270 **APTIC NO. 72035**

Tsukuda, Atsuhiko

ENVIRONMENTAL STANDARD OF NITROGEN DIOXIDES. *(Nisanka chisso no kankyu kijun ni tsuite). Text in Japanese. Seikatsu to Kankyo (Life Environ.), 19(11):5-10, Nov. 1974.*

An environmental standard for nitrogen dioxide of 0.02 ppm is proposed based on a number of studies. Nitrogen dioxide effects on the cells of animal lungs become discernible when the exposure is 0.5 ppm for 1 hr, and when this exposure is over a period of months the result is bronchitis or pulmonary emphysema. Furthermore, exposure to NO2 increases sensitivity to pneumococcus or influenza virus. Other health statistics on susceptibility to infection and chronic bronchitis in the U. S. and Japan are also cited.

50271 **APTIC NO. 71604**

Ubaidullaev, R. U. and O. V. Zelinskaya

EXPERIMENTAL INVESTIGATION FOR STANDARDIZATION OF MILBEX IN THE ATMOSPHERE. *(Eksperimental nyye issledovaniya po normirovaniyu mil beksa v atmosferom vozdukhe). Text in Russian. Gigiena i Sanit., no. 11:6-8, 1974. 1 ref.*

The acute and chronic effects of inhaled milbex were studied in humans and white rats to standardize the maximum allowable concentration of this pesticide in air. The odor threshold was 0.37 mg/cu m, while the subthreshold concentration was found at 0.28 mg/cu m. The latter concentration caused changes in the bioelectrical brain currents in the test persons who showed the lowest odor threshold for this substance. In a lower concentration of 0.19 mg/cu m, milbex did not cause any changes in the brain currents. Experiments on albino rats continually exposed to milbex in the air for 3 mo revealed that the maximum allowable single-time concentration, and the maximum allowable daily average concentration of milbex in the air of populated areas should be set at 0.20 mg/cu m and 0.10 mg/cu m, respectively. Higher concentrations of milbex caused changes in the chronaxie of the antagonistic muscles; an increase in the serum alkaline phosphatase activity; a reduction of the ascorbic acid levels in the liver, kidney, and adrenals; and a reduction in the cytochrome oxidase and succinate dehydrogenase activities in the kidney and liver.

50272 **APTIC NO. 72270**

Wiadrowska, Bozena and Tadeusz Syrowatka

A METHOD OF DETERMINATION OF TOTAL MERCURY BY MEANS OF ATOMIC ABSORPTION SPECTROPHOTOMETRY. *(Metoda oznaczania rteci calkowitej za pomoca spektrofotometrii atomowo-absorpcyjnej). Text in Polish. Roczniki Panstwowego Zakladu Higi., 25(6):701-707, 1974. 23 refs.*

An atomic absorption spectrophotometric method was investigated for the determination of total mercury in biological materials. The recovery rate for the method was 88.6% for blood, 86.6% for kidney tissue, and 83.3% for liver tissue. Determinations of mercury content in hair were also performed and compared with results of other methods.

50273 **APTIC NO. 71748**

Yamashita, N. and T. Sasaki

EFFECTS OF ENVIRONMENTAL POLLUTION ON THE INHABITANTS IN HIGASHIYAMA DISTRICT, KYOTO CITY. PART II: RESULT OF EPIDEMIOLOGICAL SURVEY AND CLINICAL FINDINGS. *(Kyoto shinai Higashiyama chiku ni okeru kankyo osen no jumin ni oyobosu eikyo (sono 2) eikigaku chosa rinsho shoken o chushin to shite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10)Suppl.:434, Oct. 1974. (Presented at the Japanese Society of Public Health, Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974.)*

Subjective symptoms of inhabitants along Higashiyama Street in Kyoto those of inhabitants in back streets were compared. The symptoms which showed significant difference of frequency between two groups (with percentage complaint) were: discharge from the eyes (16 and 11%), nasal obstruction (28 and 19%), pain in throat (40 and 23%), throat swelling (20 and 11%), black pituita (21 and 7%), occasional husky voice (30 and 17%), natural voice becoming louder (24 and 10%), colds (45 and 31%), prolonged suffering from cold (36 and 21%), frequent sputum night and morning (32 and 19%). According to the clinical and physiological examinations, no difference was found in general internal medicine, abnormal respiratory findings, blood pressure, urinalysis (protein and sugar), blood, EKG, lung ventilation function, and chest X-ray image between both groups. Differences were found in eyehyperemia (22 and 4%) and abnormal cornea (4 and 12%). Lead in blood, urinocoproporphyrin, and punctate basophile erythrocytes showed no local differences.

50274 **APTIC NO. 71647**

Yokoyama, T.

CLINICAL FINDINGS ON PHOTOCHEMICAL SMOG INJURY NO. 3. *(Kokagaku smog to sono higai no rinsyo 3). Text in Japanese. Nihon Shonika Gakkai Zasshi (Soc. Paediatr. Jap.), 78(11):830-831, Nov. 1974. (Presented at the Japan Society of Pediatrics Annual Meeting, 77th, Osaka, Japan, May 1974.)*

During suspected air pollution episodes of photochemical smog in Tokyo, the respiratory functions of schoolchildren showing symptoms of injury were examined. No significant information was obtained by routine spirometry and respiratory impedance determination of 3 Hz. In more severe cases, a decrease of oxygen partial pressure in arterial blood was noticed. There were many cases of large differences between partial pressure of nitrogen and oxygen in alveolar gas and gas in arterial blood, especially when the oxidant concentration was more than 0.10 ppm. However, even in more severe cases than the above, the difference was almost normal when the oxidant concentration was less than 0.1 ppm. High differences were transient. Respiratory alcarosis was detected. No significant correlation was found between several indices obtained by flow-volume curve and the gases in arterial blood.

50275 **APTIC NO. 71731**

Yoshida, R., M. Adachi, T. Motomiya, A. Kosaku, and K. Hayashi

RESULTS OF INVESTIGATION OF RESPIRATORY DISEASE SYMPTOMS. *(Chiba-shi ni okeru kokyuki shojo yusho-ritsu chosa seiseki). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10)Suppl.:433, Oct. 1974. (Presented at the Japanese Society of Public Health, Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974.)*

About 90% of the exhausted sulfur oxides amounting to 43,041 tons/yr (1972) in Chiba City comes from the Chiba factory of the Kawasaki Steel Works and the Chiba Power Station of the Tokyo Electric Power Company. In front of these factories there is a highly air polluted area. A health survey was carried out on adults of ages 40-59 in four districts including the most highly polluted area (A). According to the environmental standards committee of specialists of the Environment Agency, it is at the level of recognizing undesirable effects due to air pollution that the morbidity of simple chronic bronchitis is more than 3%. The results of the present survey showed that the morbidity of four districts was over 3%, especially that of A district.

50276 **APTIC NO. 71877**

Air Pollution Control Assoc., Pittsburgh, Pa., TE-1 Biomedical Committee

HAVE HEALTH EFFECTS OF AIR POLLUTION BEEN OVERSOLD? *Proc. Air Pollution Control Assoc. Sess., Annu. Meet., 67th, Denver, Colo., 1974, 47p. (June 14.)*

The health effects of air pollution are critically reviewed from the standpoint of public interest, medical research, the position of government, attitudes of industry, and Canadian experience with statistical analyses of respiratory ailments. Despite diverse viewpoints among different sectors concerning the impact of air pollution on human health, there generally appears to be a need for more research on the identification and quantification of air pollution-induced health effects in order to determine the true social costs of control technology. Included in an appendix is an executive summary of the Proceedings of the Conference on Health Effects of Air Pollution which was convened at the National Academy of Sciences on October 3-5, 1973. The health effects of carbon monoxide, sulfur oxides, particulates, nitrogen oxides, hydrocarbons, and oxidants are considered and it is concluded that the present knowledge of health effects affords no compelling basis for either raising or lowering currently mandated primary air quality standards.

50277 **APTIC NO. 72383**

Kure Municipal Government (Japan), Environmental Pollution Countermeasures Section

RESULTS OF HEALTH EXAMINATION ON THE EFFECTS OF AIR POLLUTION ON RESPIRATORY SYSTEM. *(Taiki-osen no kokyuki ni oyobosu kenkochosa). Text in Japanese. In: Present States of Environmental Pollution and Problems in Kure City. Rept. 3, p. 21, 1974.*

Four groups of women over 40 living in different areas of Kure City were examined by history taking, blood pressure determination, urinalysis, lung function analysis, and chest X-rays between Nov. and Dec. 1973. The ratio of women who showed abnormal values for each item to the total number examined was, respectively, 30/174, 19/165, 62/174 and 36/174. The ratio of abnormal cases to the total number was also con sidered locally. Air pollution in Kure City is not directly responsible for impairment of the respiratory system of women.

1973

50278 **APTIC NO. 71948**

MacEwen, J. D. and E. H. Vernot

TOXIC HAZARDS RESEARCH UNIT ANNUAL TECHNICAL REPORT: 1973 (FINAL REPORT). *California Univ. at Irvine, Dayton, Ohio, Overlook Branch, Aerospace Medical Research Lab. Contract F33615-73-C-4059, Proj. 6302, Task 01, Work Unit 63020113, AMRL-TR-73-83, 170p., Aug. 1973. 38 refs.*

NTIS, DDC: AD-771 025

The activities of the Toxic Hazards Research Unit for the period June 1972-May 1973 are reviewed. Acute inhalation toxicity experiments were conducted on rats with mixtures of carbon monoxide and hydrogen cyanide. Acute toxicity tests on inhaled HCN for 5-minute exposures conducted in combination with CO did not show any increased toxic response at carboxyhemoglobin levels of 25% saturation. Emergency Exposure Limits (EEL) were validated for chlorine pentafluoride and 24-hour EEL of 1 ppm is proposed for monomethylhydrazine. A series of chronic inhalation toxicity studies were conducted with hydrazine, methylhydrazine, and coal tar aerosols. Oral percutaneous toxicity evaluations were conducted (to determine LD-50 values for mixed creosols, allyl isothiocyanate, methyl isothiocyanate, methyl isocyanate, ortho-nitroaniline, ethyl chloracetate, and phenyl isocyanate. (Author abstract modified)

50279 **APTIC NO. 65092**

Sadanobu, Kagamimori, Makino Tokumi, Hiramaru Yoshitake, Kawano Shun ichi, Kato Takashi, Nogawa Koji, Kobayashi Etsuko, Sakamoto Michiko, Fukushima Masaaki, Ishizaki Arinobu, Kanagawa Katsuko, and Azami Shozo

STUDIES CONCERNING THE EFFECTS ON THE RESPIRATORY ORGANS OF ATMOSPHERIC POLLUTION CAUSED BY DUSTS CONSISTING MAINLY OF MANGANESE (REPORT NO. 2) ON THE CHANGES IN THE EFFECTS OF THE HUMAN ORGANISM AFTER THE ENVIRONMENT HAS BEEN IMPROVED. *Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(8):413-420, Aug. 15, 1973. 16 refs. Translated from Japanese, 31p.*

Health questionnaire surveys and measurements of lung ventilation functions and respiratory resistance were used to assess the improvement in respiratory symptoms among 1298 junior high school students in an area polluted by manganese dust following installation of particle collectors in a ferromanganese plant believed to be responsible for the pollution. The same students had been similarly examined previously and prior to installation of the particle collectors. Improvements were seen in the following subjective symptoms: sputum during the daytime and at night in the winter, coughing and sputum continuing for longer than three weeks during the past three years, and clogging of nose and nasal colds during the winter. The only respiratory symptom that appeared in high frequency in the polluted school versus a control school after particle collector installation was wheezing among the male students. Symptoms of nose, throat, and eye disorders were no longer any higher than in control students. Almost identical mean lung ventilation function values were recorded for the polluted school versus a control school, though among third-grade male students in the polluted school, the one-second ratio was still low and there was a high respiratory resistance.

50280 **APTIC NO. 71662**

Thiele, H., R. Gohlke, and R. Rothe

EXPERIMENTAL AND CLINICAL STUDY OF CHRONIC POISONING BY CARBON MONOXIDE. *(Experimentelle und klinische Untersuchungen zur Frage der chronischen Kohlenoxidvergiftung). Text in German. Sante Publique (Bucharest), 16(2):219-224, 1973.*

Animal and clinical tests on carbon monoxide-exposed subjects are described in an attempt to demonstrate the specific chronic action of CO. Rabbits exposed to 802 ppm and 284 ppm CO for 103 and 112 days, respectively, for 5 days a week showed carboxyhemoglobin values in the respective ranges of 2.5-11.9% and 2.5-8.3%. The macroscopic findings and gain in weight were normal, except for an increase by 20% and 14% in the weight of the liver. Dose-dependent increases in the hemoglobin and hematocrite levels, significant increases in the pyruvate level of the first group, and significant reductions of the cholinesterase, inorganic phosphate levels, hepatic lipase, phosphate, phosphatase, and cytochrome-C oxidase were observed. An increased cholinesterase level was found in brain homogenates. Inhibition of the glucose-6-phosphatase was observed. There is a specific damage due to CO in addition to merely the hypoxic effect. Clinical tests in humans with and without acute, subacute, or chronic exposure to CO revealed that acute and subacute poisoning have no additional pathogenic effect in chronic exposure, i.e., indicate the existence of primary chronic poisoning with CO.

50281 **APTIC NO. 71917**

Young, S. L., E. Postlethwait, and J. H. Knelson

INCREASED GLUCOSE UPTAKE WITH ONSET OF PULMONARY EDEMA IN ISOLATED PERFUSED RAT LUNGS. *Preprint, American Physiological Society, Bethesda, Md., 19p., Jan. 1975. 9 refs. (Presented at the American Physiological Society Meeting, Rochester, N. Y., Aug. 1973.)*

Specific nitrogen free anesthetized rats were exposed to nitrogen dioxide mixed with 95% oxygen and 5% carbon dioxide, followed by studies of glucose utilization in isolated perfused rat lung before and during pulmonary edema. Edema occurred spontaneously in all lungs exposed to greater than 20 ppm NO2 as well in some non-exposed lungs. Glucose uptake from the lung perfusate increased markedly during the period of edema formation. Edematous lungs appeared poorly compliant and ventilated unevenly. The increase in glucose uptake from the perfusate by edematous rat lungs was attributed to sequestration in lung tissue and edema fluid, inequalities in lung perfusion during control and edematous states, and changes in lung metabolism.

1972

50282 **APTIC NO. 71904**

Hammer, D. I., C. M. Shy, D. C. Calafiore, C. G. Hayes, K. E. McClain, and J. F. Bivens

CIGARETTE SMOKING, AIR POLLUTION AND SOCIOECONOMIC STATUS IN RELATION TO ACUTE AND CHRONIC RESPIRATORY DISEASE. *Preprint, American Medical Assoc., Chicago, Ill., 17p., 1972. 57 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 1972.)*

Medical questionnaires, demographic information, and measured air pollution levels were used to examine the effects of cigarette smoking, air pollution, and the socio-economic status of urban and rural populations on acute and chronic respiratory disease. Self pollution with cigarette smoke was the single most important determinant of chronic bronchitis., having roughly three times the effect of urban air pollution. Cigarette smokers also experienced a shift from the more benign acute upper respiratory illnesses to the more serious acute lower respiratory illnesses, but the relative effect was less than that caused by ambient air pollution. Occupational exposures to air pollution were more important than ambient air pollution exposure and less important than cigarette smoking. Migrants moving from polluted urban areas to less polluted communities showed a much lower prevalence of chronic bronchitis than similar cohorts who remained in the more polluted areas. Socioeconomic status was not a powerful determinant of chronic bronchitis but did influence acute lower respiratory illness reporting in a complex fashion. Ambient sulfur dioxide air pollution was more important than socio-economic status as a determinant of acute lower respiratory illness. Air pollution caused detrimental health effects among all citizens, regardless of age, sex, smoking habits, or social station. (Author summary modified)

50283 **APTIC NO. 75159**

Marcus, Allan H.

A STOCHASTIC MODEL FOR ESTIMATING POLLUTANT EXPOSURE BY MEANS OF AIR QUALITY DATA. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-15, 1974. 21 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

A stochastic model for estimating pollutant exposure by means of air quality data is described. The model is formulated mathematically in terms of the excursions of filtered stochastic integrals of pollutant concentrations when the latter are functions of a Gaussian random field. The data base required for using the model to predict pollutant exposure includes: meteorological variables; an inventory of the major point, line and area emission sources; demographic data for the estimation of personal trajectories for various population types; and reliable dose-response data for various pollutants.

1971

50284 **APTIC NO. 71897**

Lave, Lester B. and Eugine P. Seskin

HEALTH AND AIR POLLUTION. THE EFFECT OF OCCUPATION MIX. *Swed. J. Econ., no. 1:76-95, 1971. 13 refs.*

The 1960 mortality rates for 117 American cities are analyzed in relation to levels of suspended particulates and total sulfates which were measured for 26 biweekly periods. Socio-economic factors such as race, income, population density, and age are accounted for as in previous studies, and the addition of occupation mix in the present study results in little change in the estimated health effects of air pollution. A 10% decrease in the measured levels of particulates and sulfates is estimated to decrease the total death rate by 0.9%. A 50% reduction in air pollution is estimated to increase the life expectancy of a newborn infant by 3-5 yr. Overall, air pollution appears to have a marked effect on increasing mortality rate. The resulting health effects are also translated into dollar terms.

50285 **APTIC NO. 71525**

Lyuderits, P. and K. Khorn

STUDY OF THE EFFECT OF CARBON MONOXIDE IN AUTOMOTIVE EXHAUST GASES ON THE HEALTH OF TRAFFIC POLICEMEN. *(Issledovaniye vozdeystviya okisi ugleroda iz vykhlopnykh gazov avtomobiley na sostoyaniye zdorov ya regulirovshichikov dvizheniya). Text in Russian. Gigiena i Sanit., no. 36:81-84, July 1971. 4 refs.*

The effect of carbon monoxide in automotive exhaust gases on the general health status and neurological health of traffic policemen was studied. Complaints about headache, nausea, and emesis, typical symptoms of chronic poisoning by CO, were more frequent in traffic policemen exposed to CO in streets than in a control group of traffic policemen. While the COHb levels measured in exposed traffic police were usually not higher than those found in smokers, the former sometimes showed high levels even before going on duty, which is indicative of the retarded elimination of CO following prolonged exposure. The critical flicker fusion test under hexobarbital load revealed impairment of the function of the central nervous system in exposed subjects, which was mostly, but not solely, due to the effect of CO.

1970

50286 **APTIC NO. 71988**

Burger, B. F. and F. M. Engelbrecht

THE BIOLOGICAL EFFECTS OF THE INTERNATIONAL STANDARD REFERENCE ASBESTOS SAMPLES (UICC) ON THE LUNGS OF RATS. *S. African Med. J. (Capetown), vol. 44:1271-1274, Nov. 7, 1970. 14 refs.*

The fibrogenetic effects of five standard reference asbestos samples on the lungs of female albino rats were investigated. Samples of amosite, antophyllite, crocidolite, and chrysotile A (mean fiber length of 2.0-3.4 micron) were suspended in normal saline and administered by intratracheal injection at doses of 50 mg/animal. Chrysotile B (mean fiber length of 17.0 micron) was injected into one of the lungs at a dose of 25 mg. No marked macroscopic differences were detected among the lungs from different groups of animals injected with the short-fiber samples, whereas lungs injected from the chrysotile B group were usually hard and non-functional. The non-injected lung of the chrysotile B group was considerably enlarged. Microscopically, all of the lungs showed an initial macrophage mobilization at the 60-day stage of observation, with most of the macrophages being concentrated in the alveoli adjoining the respiratory bronchioli and to a lesser extent in the peribronchiolar and perivascular lymphatics. The grade and amount of fibrosis produced by the short-fiber asbestos samples were slight and consisted of isolated areas of diffuse reticular connective tissue. Long-fiber samples (chrysotile B), in contrast, caused a more pronounced cellular reaction followed by a compact nodular fibrosis. A progressive connective tissue response persisted in the lungs of the chrysotile B group at the termination of the experiment (240 days), while lungs from the chrysotile A group, for example, appeared normal at the 180-day stage. The incidences of infection and chronic inflammation were also much higher in the long-fiber group than in the short-fiber group.

50287 **APTIC NO. 75048**

Takeuchi, Tadao, Hideyo Matsumoto, Mitsuaki Eto, Hidetoshi Kojima, and Azumahiko Miyayama

MINAMATA DISEASE AND THE PATHOLOGICAL CHANGES AFTER A PERIOD OF TEN YEARS. *(Junen keikago no Minamata-byo to sono byohen). Nihon Iji Shinpo (Japan. Med. J.), no. 2402:22-27, May 9, 1970. 10 refs. Translated from Japanese, 27p.*

The Minamata disease, which is caused by organic mercury poisoning, is discussed, and pathological changes after a period of 10 years are reviewed. The main changes include disturbances of the nervous system. Studies made of the development of the physique and physical functions of schoolchildren in Fukuro showed that there are many fluctuations in the physical functions, and that it is impossible to distinguish any sufficiently clear-cut characteristics in comparison with children under control conditions. Generally, however, lower age groups of 10 or 11 years or less were inferior in their physical functions in Fukuro compared with a control school; the tendency reversed at ages of 12 or more. Minamata disease results from environmental pollution, and therefore Minamata disease patients receive compensation. Changes in Minamata disease symptoms in adults compared to infants and children are discussed. The chief symptoms in adults are stricture of the visual field, ataxia, pararthria, and sensory disturbances, followed by hearing disturbances, disturbances of gait, and light psychiatric disturbances. Autopsy findings and diagnosis of Minamata disease based on these findings for 29 cases of Minamata disease are reviewed. The pathological changes, age differences in the pathological changes and the brain weight, Minamata disease cases treated as other psychiatric or nervous diseases, masked and cryptic Minamata disease cases, and shifts in the amount of mercury in organs in Minamata patients are discussed.

1969

50288 **APTIC NO. 65102**

Reichenberger, M.

EPICUTANEOUS ALLERGENS IN MINERS OF THE RUHR BASINS. *(Epikutane Allergene bei Untertagearbeitern des Ruhrbergbaus). Berufsdermatosen (Aulendorf), 17(4):199-201, 1969. Translated from German, 5p.*

Epicutaneous allergy tests performed from 1962 to 1969 on 808 miners of the Ruhr basin revealed an allergization in 377 persons. Sensitization to metal ions, especially potassium bichromate, was observed most frequently, followed by sensitization to rubber components, drugs, disinfectants, and mercury compounds. Comparison of the findings with similar data from other occupations showed that only persons working in the construction industry display a similarly high proportion of sensitivity to metal ions. Possible contact allergens for the underground miners were: cement grades, chrome leather gloves, wood preservatives (Wolman salts), industrial oils used as drilling coolants, rubber protective clothing, disinfectants, and mercury-containing explosive primers.

1940

50289 **APTIC NO. 75051**

Businso, Lino

THE RICKETS-PRODUCING EFFECT OF BERYLLIUM CARBONATE. *(L azione rachitogena del carbonato di berillio). Rass. Med., vol. 11, p. 417-442, 1940. Translated from Italian.*

The rickets producing effects of beryllium carbonate in rats were investigated. Experiments with young rats indicate that beryllium carbonate adversely affects the osteogenic processes leading to a series of pathological manifestations including weight loss, curving of the spine, hyperplastic alterations of the conjugation cartilage, modifications of the underlying trabecular structure, hypocalcification, and thickening of the chondriocostal joints. Rickets cannot be attributed to a simple deficiency since it can be brought about also through maternal milk, and since it cannot be modified by cod liver oil or vitamin- containing preparations. A broader pathogenic process is involved in which toxicity has the main role. (Author summary modified)

EFFECTS-PLANTS AND LIVESTOCK

1975

50290 **APTIC NO. 72131**

Eller, Benno M. And Ulrich Brunner

ROAD DUST CHANGED ABSORPTION OF SOLAR RADIATION BY PLANT LEAVES. *(Der Einfluss von Strassenstaub auf die Strahlungsabosrption durch Blaetter). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. B, 23(1-2)137-146, 1975. 6 refs.*

Diffuse spectral reflectivity, transmissivity, and absorptivity of clean and dusty Rhododendron leaves have been determined. Measurements were carried out in January to March. Values were taken at wavelengths of 400 to 1350 nm by a spectroradiometer ISCO SR with attached integrating sphere. For dust-covered leaves absorptivity for radiation at 750 to 1350 nm is very much increased. Reflectivity and transmissivity values are lowered at the same wavelengths. The effect of dust is reduced partially by rain and snowfall cleaning the leaf. Increased absorption of solar radiation must change the energy balance of the leaf and leaf temperature. Heat injured leaves were observed.

50291 **APTIC NO. 72381**

Endo, R., S. Nakazawa, K. Namie, and K. Takemoto

EFFECTS OF AIR POLLUTION ON BIRD LUNGS. *(Taiki-osen no chohai ni oyobusu eikyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 30(1):162, April 1975.*

To study the effects of several air pollutants on the lungs of wild pigeons, coal powder (3 mg/100 g body weight) and methyl cholanthrene (3 mg/bird) were injected singly and in combination into the lung of Japanese quails. Six, 12, and 24 months after injection their lungs were examined histomorphologically. Proliferous changes occurred in the methyl cholanthrene group and methyl cholanthrene plus coal powder group, mainly in the teritiary bronchus with epithelial proliferation surrounding the diverticulum. In both groups the development of lymph tissue was very poor. Persistence of destruction was only found in the methyl cholanthrene plus coal powder group. Sedimentation of coal powder was stronger in coal group, especially around the blood vessels. The effect of cholanthrene was prolongated by coexistence of coal powder; however, no carcinogenesis was observed.

50292 **APTIC NO. 72127**

Leh, Hans-Otfried

LEAD CONTENTS IN MUSHROOMS. *(Bleigehalte in Pilzen). Text in German. Z. Lebnsm. Unters. -Forsch. (Munich), 157(3):141-142, 1975. 5 refs.*

The lead contents of canned and fresh mushrooms were analyzed by photometric determination after dry ashing and dithizone extraction. The average lead content was 0.49 ppm with extreme values of 0.10-1.0 ppm on a fresh weight basis and 5.5 ppm (2.0-13.5 ppm) on a dry weight basis. Lead content increases with the size (age) of the mushrooms. The influence of canning on lead content is not clear; however, it appears that the canning process has a lesser influence than the size of the mushrooms.

50293 **APTIC NO. 72219**

Schnappinger, Melvin G., Jr., David C. Martens, and Carl O. Plank

ZINC AVAILABILITY AS INFLUENCED BY APPLICATION OF FLY ASH TO SOIL. *Environ. Sci. Technol., 9(3):258-261, March 1975. 12 refs.*

The effect of fly ash on the availability of soil zinc was studied using six of 15 samples collected from power plants located in nine states. The fly ash ranged from 12.9-378.2 ppm in total zinc and from 1.5-93.0 ppm in acid extractable zinc. Incorporation of an acidic fly ash sample into Frederick silt loam and Westmoreland silty clay loam corrected zinc deficiency of corn plants grown in the greenhouse on the two soils. Dry weight and zinc uptake data indicated approximately equal availability of zinc in the acidic fly ash and in hydrated zinc sulfate. Application of fly ash samples with relatively high titratable alkalinities decreased the dry weight of corn plants grown in the greenhouse on the Frederick soil. The decrease was attributed partly to accentuation of zinc deficiency at the higher levels of alkalinity established in the soil by application of the fly ash. Thus, the diverse effects of different samples of fly ash on zinc availability should be considered when soils in which plants are to be grown are used for disposal of the material.

50294 **APTIC NO. 72132**

Thalenhorst, W.

INVESTIGATIONS ON THE INFLUENCE OF FLUORO CONTAINING AIR POLLUTANTS UPON THE SUSCEPTIBILITY OF SPRUCE PLANTS TO THE AT-

TACK OF THE GALL APHID SACCHIPHANTES ABIETIS (L.). *(Untersuchungen ueber den Einfluss fluorhaltiger Abgase auf die Dispostion der Fichte fuer den Befall durch die Gallenlaus Sacchiphantes abietis (L.). Text in German. Z. Pflanzenkrankh. Pflanzenschutz, 81(12):717-727, 1975. 8 refs.*

The influence of atmospheric pollutants (especially fluoro compounds) upon the gall density of Sacchiphantes abietis (L.) in young spruce stands has been demonstrated. A histologically visible defense reaction of the cortex tissue in the basis of the buds against the sting of the Pseudofundatriz s stylets is described. Complicated relations were observed between position and distance of the plants to the fluoro pollution focus on the one hand and density and survival rate of the pseudofundatrices and the percentage of defense reactions on the other.

50295 **APTIC NO. 69661**

Environmental Protection Agency, Corvallis, Oreg., National Ecological Research Lab.

AN APPROACH TO THE INVESTIGATION OF THE BIOENVIRONMENTAL IMPACT OF AIR POLLUTION FROM FOSSIL FUEL POWER PLANTS. *22p., 1975 (?). 21 refs.*

A prototype investigation of the bioenvironmental effects of air pollution challenge from coal-conversion facilities is summarized and existing research programs are reviewed. The new program aims to measure and predict change in a grassland ecosystem as a function of meaningful environmental parameters including air pollutants. Objectives, rationale, and the overall design of the program are presented. The Tennessee Valley Authority (TVA) is sampling the major pathways of sulfur decomposition and movement in the environment and is assessing the effects of pollution on growths of timber stands. It is also testing the feasibility of applying remote sensing techniques to the detection of sulfur dioxide injury in the vicinity of the Widows Creek Steam Plant. The La Cygne, Kansas coal-fired Power Plant Study is evaluating the influence of stack emissions from a coal-fired electric generating plant on the surrounding rural agricultural and old field communities.

1974

50296 **APTIC NO. 71931**

Bennett, Jesse H. and A. Clyde Hill

ACUTE INHIBITION OF APPARENT PHOTOSYNTHESIS BY PHYTOTOXIC AIR POLLUTANTS. *Am. Chem. Soc. Symp. Ser., no. 3:115-127, 1974. 23 refs.*

Plant fumigation experiments in environmental chamber systems were performed to assess the effect of various air pollutants on photosynthesis. Oat, barley, and alfalfa canopies required treatments with more than 1 pphm hydrogen fluoride, about 5 pphm ozone or chlorine, 20 pphm sulfur dioxide, and 40-60 pphm nitrogen dioxide or nitric oxide before apparent photosynthesis rates were measurably depressed after 2 hr of exposure. Plants previously exposed to NO or SO2 recovered much more quickly than plants given HF exposures. Plants treated with Cl2, O3, or NO2 recovered at intermediate rates. Sulfur dioxide-NO2 mixtures induced greater than-additive inhibition of alfalfa apparent photosynthetic rates, with the greatest synergistic effects being observed at low concentrations (15 pphm for each gas). No synergism was evident at 50 pphm of each gas. All other pollutant combinations tested, with the possible exception of SO2 and HF, caused plant responses which are additive in suppressing apparent photosynthesis rates. Ozone or SO2 in combination with NO2 appears capable of measurably suppressing carbon dioxide uptake rates of sensitive plants in concentrations approximating present air quality standards.

50297 **APTIC NO. 68044**

Martin, W. and T. Keller

ON THE INFLUENCE OF POLLUTED CITY AIR ON VEGETATION. *(Ueber den Einfluss verunreinigter Stadtluft auf die Vegetation). Text in German. Umwelthygiene, 25(10):221-227, Oct. 1974. 41 refs.*

The quality and phytotoxicity of urban air was studied in the city of Zurich, Switzerland, by determining the peroxidase activity in specimens in Picea abices L. and Fraxinus americana exposed as indicator plants at different places. While the exposed indicator plants showed no visible symptoms of poisoning by air pollutants, their peroxidase activity was significantly higher than in a control group in summer, which is indicative of the harmfulness of traffic-generated air pollutants, possibly ethylene, ozone, and nitrogen oxides for sensitive species. The metabolic changes brought about in the plants by air pollutants, as indicated by the increased peroxidase activity, demonstrate stress and possibly decreased plant vitality.

50298 **APTIC NO. 72390**

Stevcevska, V. and J. Jovanovic-Kolar

THE INFLUENCE OF AIR POLLUTION ON THE CONTENT OF 3,4-BENZPYRENE IN NONREFINED OIL OBTAINED FROM SUNFLOWER SEEDS GROWN IN DIFFERENTLY POLLUTED AREAS. *(Utjecaj zagadenosti zraka na sadrazaj 3,4-benzpirena u sirovom suncokretovom ulju). Text in Serbo-Croatian. Arhiv. Hig. Rada Toksikol. (Yugoslavia), 15(2):191-196, 1974. 6 refs.*

The content of benzo(3-4)pyrene was determined in nonrefined oil obtained from sunflower seeds grown in areas with varying degrees of air pollution and in soil samples. Influences during the harvest, transport, storage and final processing of the samples were excluded. The amount of the carcinogen measured in the oil ranged from 0.4-40.5 micrograms/kg oil and showed a direct relationship to the intensity of air pollution in a given region. The relatively high benzo(3-4)pyrene content of soil samples (29.3-900.0 micrograms/kg soil) suggested the possibility of accumulation of this carcinogen.

1973

50299 **APTIC NO. 71938**

Gassman, Merrill L.

A REVERSIBLE CONVERSION OF PHOTOTRANSFORMABLE PROTOCHLOROPHYLL(IDE)650 TO PHOTOINACTIVE PROTOCHLOROPHYLL(IDE)633 BY HYDROGEN SULFIDE IN ETIOLATED BEAN LEAVES. *Plant Physiol., vol. 51:139-145, 1973. 28 refs.*

The relationship of phototransformable protochlorophyll(ide) to photoinactive protochlorophyll(ide) was studied in the primary leaves of 7- to 9-day-old dark-grown bean seedlings. Subjecting the leaves to hydrogen sulfide caused an immediate loss of phototransformable protochlorophyll(ide)650 and a simultaneous increase in photoinactive protochlorophyll(ide)633. When such leaves were returned to air or nitrogen, the absorbance at 650 nm increased, whereas the absorbance at 633 nm decreased and the photoactivity was restored. The reversion of protochlorophyll(ide)633 to protochlorophyll(ide)650 and 1/2 complete in 3 min at 22 C in 8-day-old leaves. Ninety-five percent recovery of protochlorophyll(ide)650 was obtained when exposure to H2S was less than 3 min in duration; longer periods reduced the reversion capacity proportionately. The leaves were relatively undamaged by brief exposure to H2S, judged by electron microscopy and by ability to synthesize chlorophyll under continuous illumination. Hydrogen sulfide had no immediate effect upon the absorption properties of a partially purified preparation of the protochlorophyll(ide) holochrome, an etioplast suspension, or upon leaves subjected to freezing and thawing. Compounds such as hydrogen cyanide and ammonia caused an irreversible conversion of protochlorophyll(ide)650 to protochlorophyll(ide)633 with total loss of photoactivity.

Sulfhydrl agents, such as beta- mercaptoethanol and cysteine, caused a slow, irreversible transformation of the photoactive pigment to the photoinactive form and inhibited the ability of the leaves to synthesize chorophll under continuous illumination. The results suggested that H2S may alter the interaction between the source of hydrogens on the protein moiety of the holochrome and the chromophore in vivo by reducing a disulfide bond in the protein, thereby causing a reversible conformational change in the complex. (Author abstract modified)

50300 **APTIC NO. 69818**

Lumis, G. P., G. Hofstra, and R. Hall

SENSITIVITY OF ROADSIDE TREES AND SHRUBS TO AERIAL DRIFT OF DEICING SALT. *HortScience, 8(6):475-477, Dec. 1973. 7 refs.*

Specific injury symptoms were observed on 75 deciduous and coniferous species growing adjacent (8-40 m) to roadways and exposed to aerial drift of deicing salt sprays. Both naturally occurring and planted trees and shrubs were included. Injury was more severe on the side of the plants facing the road as well as on the downwind side of the road. Symptoms diminished as the distance from the roadway increased or as traffic speed and volume decreased. Damage to conifers became evident in late winter, while injury to deciduous species was not visible until spring growth and flowering began. On coniferous species the injury appeared as browning and necrosis of the needles which began at the tip and progressively spread basipetally. The branches became bare, and the plant had a distinctly one-sided appearance when spray drift continued for more than one season. Injury to deciduous species was expressed as twig dieback due to the failure of vegetative and flower buds to develop. Plants with resinous buds, submerged buds, and needle cuticular wax seemed resistant to damage.

50301 **APTIC NO. 71627**

Ota, K.

EFFECTS OF SULFUR DIOXIDE ON FLOWERING OF OSMANTHUS FRAGRANS VAR AURANTICUS. *(Kinmokusei no kaika to iwosankabutsu no kanrensei ni tsuite). Text in Japanese. Zoen Zasshi (J. Jap. Inst. Landscape Archit.), 36(4):25-31, April 1973. 14 refs.*

The effects of sulfur dioxide on the flowering of Osmanthus fragrans var. auranticus were studied by experimental exposures and a field survey. Exposure of the trees to SO2 at concentrations of 4.09 - 5.60 ppm for 9 hr in Aug. and 4.79 - 5.02 ppm for 6 hr at temperatures of about 30 C produced 98.8% leaf injury, 9.5% flowering twig injuries, and a 0.26% sulfur content of leaves. Exposures at the lower concentrations of 2.58 - 2.62 ppm and 2.69 - 3.09 ppm for the same periods produced 49.0% leaf injury, 24.1% flowering twig injury and 0.23% sulfur content of leaves. Exposure to the control level of around 25% produced, respectively, no leaf injury, 20.2 (26.9)% injury to flowering twigs, and 0.23 (0.24)% sulfur content of leaves. The results of a field survey in Chiba Prefecture facing the Tokyo coastal industrial zone were inhibition of plant growth (positive correlation between tree health and flowering) and a high negative correlation between flowering and SO2 concentration 10 months ago (-0.87). Chronic injury due to SO2 inhibits development of the tree, and flowering decreases. Flowering of this tree could be utilized as an indicator of chronic air pollution.

1972

50302 **APTIC NO. 71999**

Calpouzos, L., M. E. Madson, F. B. Martin, A. P. Roelfs, J. R. Welsh, and R. D. Wilcoxson

DEVELOPMENT OF A MODEL TO DESCRIBE THE RELATIONSHIP BETWEEN AN AIRBORNE PLANT PATHOGEN AND ITS IMPACT ON PLANT PRODUCTIONS. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. II, Dev., Demonstr., Eval. Models, Boulder, Colo., 1972, p. 33-35, 1973, AP-USIBP-H-73-3. (July 12-14.)*

The development of a mathematical model for describing the relationship between rust fungus and its impact on wheat production is described. Data was collected from three varieties of wheat representing different genetic backgrounds and grown in three different climatological situations with at least four levels of disease incidence. A physical model was first constructed in terms of the parameters yield loss, slope of the disease progress curve, and growth-stage at the start of the epidemic. All epidemics with more than 95% loss were made equal to 95% and all epidemics with less than 5% loss were made equal to 5%. The resulting curved-surface model, when viewed from above, took the shape of a hyperbola at its lower edge and the shape of a parabola at its upper edge. A mathematical model was then constructed using general mathematical formulas to describe the above curves. The model appears to be useful for a broad range of environmental and biological conditions.

50303 **APTIC NO. 72001**

Edmonds, Robert L.

PREDICTION OF SPREAD OF FOMES ANNOSUS IN FORESTS. *United States International Biological Program, Ann Arbor, Mich., Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. II, Dev., Demonstr., Eval. Models, Boulder, Colo., 1972, p. 77-92, 1973. 30 refs. AP-USIBP-H-73-3. (July 12-14.)*

A computerized model for predicting the spread and development of Fomes annosus in a forest stand is described. The root and butt rot caused by Fomes annosus is one of the most economically important diseases of conifers in the north temperate zone of the world. A dispersion equation of Sutton that was modified by Chamberlain gives reasonable results for concentrations less than 60 m from a spore source. The deposition term is a weak link in the equation and accounts for much of the loss in accuracy beyond 60 m. The model can be further developed by including such factors as competition from other fungi as well as growth and subsequent losses in the forest stand. Although the model considers only a single sporophore, the same process is repeated for other sporophores; thus the total number of potential colonies from different sources can be summed.

EFFECTS-MATERIALS

1975

50304 **APTIC NO. 72313**

Feilden, Bernard M.

THE CARE OF CATHEDRALS AND CHURCHES. *J. Roy. Soc. Arts (London), 123(5224):196-215, March 1975. (Presented at the Royal Society of Arts, Alfred Bossom Lecture, Jan. 8, 1975.)*

The protection and maintenance of historic buildings exposed to various environmental assaults, including air pollution, is reviewed. Traditional buildings are much more vulnerable to damage from penetrating rain and vapors since, in contrast to modern building construction, historical buildings breathe, thus allowing for the invasion of vapor and moisture in molecular form. Sulfur dioxide contamination is of particular concern to building deterioration since stone decay is accelerated by 50-100 times in an acid laden atmosphere with a pH of 4 as compared to the average atmospheric pH of 7.6. Preventive measures include the provision of adequate rainwater disposal systems for diverting water away from areas susceptible to deterioration.

50305 **APTIC NO. 71849**

Upham, James B., Fred H. Haynie, and John W. Spence

FADING OF SELECTED DRAPERY FABRICS BY AIR POLLUTANTS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab., 16p., 1975. 2 refs.*

The fading characteristics of three cellulosic drapery fabrics were assessed after laboratory exposure to sulfur dioxide, nitrogen dioxide, and ozone at 50% and 90% relative humidities. The fabrics represented popular colors and moderate to high sales volume. Nitrogen dioxide contributed directly and synergistically with relative humidity to increased fading rates for one particular cotton fabric, but air pollutants did not significantly fade the other fabrics. Mathematical relationships were developed that express the amount of fading as a function of time, NO_2 concentration, and moisture content of the air, and percentage life lost as a function of NO_2 concentration and moisture content of the air. There would be a 34% reduction in useful expected life of the vulnerable fabric on exposure to ambient air at room temperature, 60% relative humidity, and containing a mean annual NO_2 concentration of 100 micrograms/cu m, which is the annual ambient primary air quality standard for NO_2 as established by the Environmental Protection Agency. (Author summary modified)

1974

50306 **APTIC NO. 71829**

Asakura, S. and S. Suzuki

FUNDAMENTAL STUDIES ON ENVIRONMENTAL CORROSION. *(Kankyu fushoku ni kansuru kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):390, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 245.)*

A polarization resistance method was used for the evaluation of corrosion of iron. Corrosion of metals exposed in atmosphere was caused by the corrosive agent with the aid of moisture. Iron was placed in sodium chloride and sulfuric acid solution at various concentrations with the existence of oxygen, and corrosion conductance, which is proportional to corrosion current, was measured and used to evaluate the degree of corrosion. Preliminary results showed that corrosion conductance increased significantly as the concentration of NaCl and H_2SO_4 increased.

50307 **APTIC NO. 72163**

Cuthrell, R. E. and D. W. Tipping

AN EVALUATION OF THREE COMMERCIAL-GRADE NICKEL ALLOYS FOR ELECTRICAL CONTACTS IN A DECELERATION SWITCH. *Sandia Labs., Albuquerque, N. Mex., Thin Film Div., 14p., Feb. 1974. 10 refs.*

NTIS: SLA-74-0053

Contact electrical resistance data for commercial-grade nickel and two nickel alloys were exposed to polluted laboratory air oxidation conditions at temperatures ranging from 73-200 F over periods of from 1-11 days. Contact resistances were consistently higher for an iron-nickel alloy than for an age-hardenable nickel alloy. Both alloys, however, appeared to be satisfactory electrical contact materials when joined to Nickel 200. Graphical representations of contact resistance as a function of wipe are presented for the oxidizing conditions listed above.

50308 **APTIC NO. 71780**

Efes, Y.

THE CORROSION OF NATURAL STONES AT THE CATHEDRAL OF COLOGNE. *Centre Belge Etude Doc. Eaux, no. 373:495-507, Dec. 1974. 8 refs.*

Sandstone and limestone core samples from the Cathedral of Cologne were chemically and physically analyzed to determine the cause and mechanism of stone deterioration. The corrosion layers showed a considerable increase in sulfur trioxide content (from the inside to the surface), pointing to thy participation of sulfuric acid in the deterioration process. Corrosion products consisted mainly of gypsum, magnesium sulfate, and sodium sulfate. Other acids also appeared to be responsible for some of the deterioration. The corrosion mechanism of both sandstone and limestone appeared to be similar, viz., the dissolution of the cement by moisture-containing acids. Following a reduction in the cohesion forces, the stones appear to be destroyed mechanically on the surface and by exfoliation below the surface.

50309 **APTIC NO. 72388**

Sadzot, M.

ATMOSPHERIC CORROSION OF STRUCTURAL STEELS. *(Corrosion atmospherique des aciers de construction). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 27(369-370): 355-356, Aug.-Sept. 1974. 7 refs.*

New, rapid methods for the corrosion testing of structural steels, as alternatives to long-term exposure, are described. It is possible to select appropriate steel grade for a given site by consulting corrosion test data obtained for similar steel grades in a climate similar to the site envisaged. Simulation of climatic, atmospheric, and pollution conditions in the laboratory represents a rapid method for the evaluation of the rate of corrosion. Another method for the evaluation of the corrosion behavior uses a closed space enclosing the steel specimen in which the reduction of the oxygen concentration is recorded as a measure of the oxygen uptake by the steel (instantaneous corrosion rate).

50310 **APTIC NO. 72389**

Verdu, J.

THE EFFECT OF AIR POLLUTANTS ON THE AGING OF PLASTIC MATERIALS, AND MEANS OF PROTECTION. *(Influence des polluants de l air sur le vieillissement des matieres plastiques, moyens de defense). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 27(369-370):360-365, Aug.-Sept. 1974.*

A theoretical study on the effect of air pollutants on the aging of plastic materials and means of protection are described. Air pollutants may hasten the aging of plastic materials in three different manners. Direct reaction with the polymer is essential in the case of atmospheric ozone. This effect can be counteracted by the incorporation of basic inhibitors and antiozonizers. Air pollutants, such as sulfur dioxide, may form active compounds in photochemical reactions, which then trigger oxidation chain reactions. They can increase aging also by intervention in polymer degradation reactions, e.g., by increasing the quantum yield of polystyrene chain breaks, as observed in the case of SO_2.

EFFECTS-ECONOMIC

1975

50311 **APTIC NO. 71898**

Griffin, James M.

AN ECONOMETRIC EVALUATION OF SULFUR TAXES. *J. Polit. Econ., 1975:669-688, 1975 (?). 23 refs.*

An econometric model of the electric utility industry is utilized to calculate the welfare gains associated with the imposition of a sulfur tax as enumerated in the Pure Air Tax Act of 1972. Simulations are run for nine alternatives which vary in their assumptions about the tax rate and the cost of flue gas desulfurization. In all cases, it is assumed that the tax becomes operative in 1976. In addition to a 15 cents/lb sulfur tax, alternative calculations are made for tax rates of 10 cents/lb and 20 cents/lb. The cumulative net welfare gains discounted back to 1976 at 7% annually are found to be positive in all cases. Differences between various cases depend primarily on the availability and cost of flue gas desulfurization. Net welfare gains are the lowest in cases where it is assumed than an economically feasible flue gas desulfurization process is unavailable. In cases where this process is available, the discounted welfare gains over a 10-year period range from $31-$42 billion. The pervasive nature of the dynamic substitution effects implicit in the model, however, suggests skepticism with proposals using tax adjustments to maintain some given air quality standard on a year-to-year basis.

50312 **APTIC NO. 72244**

Heitland, H.

TARGET CONFLICT ENVIRONMENTAL PROTECTION AND ECONOMY. COST/BENEFIT CONSIDERATIONS OF EXHAUST GAS CLEANING. *(Zielkonflikt umweltschutz und Wirtshaftlichkeit, Kosten-Nutzen-Ueberlegungen zur Abgasreinigung). Text in German. Preprint, 31p., 1975. (Presented at the Exhaust Gas Decontamination of Automobile Engines Seminar, Wuppertal, Federal Republic of Germany, Feb. 3, 1975.)*

The costs and benefits of exhaust gas cleaning as approached in the U. S. and in Europe are analyzed. The forced exhaust emission control being introduced in the U. S. leads to considerable increases in the manufacturing, and especially in the fuel costs. However, the increased priority of the energy problems is requiring a revision of the approach to emission control, and will lead to more moderate abatement of the automotive emissions in general, and of the nitrogen oxides emissions in particular. The particular situation in Europe calls for a more moderate and sensible legislative approach, mostly as a result of the very high gasoline prices as compared with the U. S. Here, these high prices have led to increased fuel economy a long time ago.

50313 **APTIC NO. 72349**

Nagai, Susumu

DEVELOPMENT OF LARGE SCALE INDUSTRIAL COMPLEX AND ITS POLLUTION. CASE STUDY OF KASHIMA AREA. *(Daikibo konbinato no kaihatsu to kogai. Kashima chiku no baai). Text in Japanese. Kogai Kenkyu (Stud. Publ. Nuisance), 4(3):7-18, Jan. 1975.*

The development of Kashima industrial complex which embraces three townships started in 1960 to promote both agricultural and industrial developments using the most advanced techniques available for environmental pollution control. The chronological development progress is described with reference to the capital investment, gross product, employment and labor supply, population, status of the use of agricultural land, annual revenue and expenditure of three townships, and township tax. The environmental pollution control policies and measures taken since 1964 are reviewed. The emphasis was placed on preliminary investigations by various means and emission standards were applied. However, many incidences of pollution damage occurred due to operational errors and accidental causes. The emission quantity of sulfur dioxide is to be reduced from 8212 N cu m/h in 1973 to 4625 N cu m/h in 1976.

50314 **APTIC NO. 72374**

Sprenger, Rolf-U.

MOST EXPENDITURES FOR THE CONSERVATION OF CLEAN AIR. *(Das meiste fuer die Luftreinhaltung). Text in German. Umwelt (Duesseldorf), 5(2):9-12, 1975. 3 refs.*

West German industries, excluding the iron and chemical industry, spent between 1971 and 1973 about $1.33 billion for environmental protection. More than half of the investments for the protection of the environment by individual industries went into combating air pollution, 30% into water protection, 10% into noise abatement, and barely 5% into solid waste disposal. The high expenditures for combating air pollution can be explained by the fact that the individual industries have to pay for this themselves while for solid waste disposal and waste water discharge public authorities, public sewers, and purification plants can be used.

50315 **APTIC NO. 71853**

Chase Econometric Associates, Inc., Bala Cynwyd, Pa.

THE MACROECONOMIC IMPACTS OF FEDERAL POLLUTION CONTROL PROGRAMS (FINAL REPORT). *Council on Environmental Quality and Environmental Protection Agency Contract, 20p., Jan. 1975. 4 refs.*

The macroeconomic impacts of federal air and water pollution control programs on inflation, economic growth, unemployment, prices, investment, and foreign trade are estimated based on the assumption that the deadlines and standards established in the Clean Air Act (as amended) and the Federal Water Pollution Control Act (as amended) will be achieved. Estimated air pollution control expenditures (investment and operating) are tabulated for both fixed industrial and non-industrial emission sources and mobile sources over the 1973-1982 time frame. The total fixed source investment and operating (annual) costs are $15,963 million and $16,865 million, respectively, for the 1973-1977 period and $1999 million and $24,908 million, respectively, for the 1978-1982 period. Mobile source emission control costs (investment and annual) are $10,900 million and $21,150 million, respectively, for 1973-1977 and $20,370 million and $53,280 million, respectively, for the 1978-1982 period. Overall, real growth and employment in 1982 are at virtually the same levels as those occurring in the absence of pollution control investment, while prices are only some 2% higher.

1974

50316 **APTIC NO. 71886**

Giarratani, F.

AIR POLLUTION ABATEMENT: OUTPUT AND RELATIVE PRICE EFFECTS, A REGIONAL INPUT-OUTPUT SIMULATION. *Environment Plann. A, vol. 6:307-312, 1974. 7 refs.*

Direct-cost estimates for air pollution abatement developed from an earlier study are used to derive technical coefficients for particulate and sulfur dioxide abatement activities of 48 industrial, non-industrial, and transportation sectors in West Virginia. Output and relative price effects are calculated for particulate matter abatement and two sulfur dioxide abatement alternatives using a static input-output model. Particulate matter abatement is chosen on the basis of cost and efficiency, while the sulfur dioxide abatement alternatives involve physical coal cleaning in directly affected sectors or physical coal cleaning as well as flue gas scrubbing and chemical coal cleaning. Sulfur dioxide is by far the more costly pollutant to reduce. Taking the average of prices before abatement as 0.975895 for the 48 sectors, the relative price for SO2 abatement is 1.00261 (first alternative) or 1.17330 (second alternative). The relative price coefficient for particulate abatement is 0.9998.

50317 **APTIC NO. 71857**

Healy, Thomas G.

COAL INDUSTRY VIEW OF THE FOSSIL FUEL CRISIS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1974. (Presented at the Air Pollution Control Association Southern Section, Nov. 4., 1974.)*

The impact of sulfur dioxide controls on the fossil fuel energy crisis is discussed from the standpoint of the coal industry. Compliance with the new source performance standard for coal (less than 0.6 lb sulfur/million BTU) is necessitating the use of stack gas sulfur dioxide cleaning since most of the country s coal has a sulfur content too high to meet such standards. Although stack gas cleaning with scrubbers is adequately demonstrated, problems involving reliability, increased cost, and solid waste disposal remain unresolved. Wet limestone scrubbing costs run about $40/KW in new plants and as high as $65/KW for retrofits. Operating costs range from between $2-$4/ton of coal. Major uncertainties in investment programs of companies seeking SO2 control are seen as resulting from insufficient evidence of reliability and applicability of SO2 control systems. An anticipated short-fall in SO2 scrubbers appears to necessitate the use of low sulfur fuels or revisions in clean air regulations.

50318 **APTIC NO. 75079**

Hoot, W. F.

PRODUCTION OF LOW-SULFUR GASOLINE (FINAL REPORT). *Kellogg (M.W.) Co., Houston, Tex., Environmental Protection Agency Contract 68-02-1308, Program Element 1AB013, ROAP 21ADE, Rept. EPA-650/2-74-130, 166p., July 1974.*

The impact on oil refineries producing unleaded, low-sulfur gasolines and also desulfurizing all gasolines produced for United States sales is evaluated in connection with the minimization of sulfuric acid mist emissions associated with catalytic converter devices installed on 1975 and later model year automobiles. The typical American refinery appears capable of producing no-lead, low-sulfur gasoline blended from normal butane, alkylate, and reformate. New desulfurization and octane upgrading facilities will have to be onstream by 1977 to produce the required sales percent of both no-lead, low-sulfur gasoline and premium gasoline. The total gasolines can be made low sulfur by hydrodesulfurization of the gas oil feedstock for catalytic cracking and by hydrodesulfurization of the light virgin and light thermal gasolines. Economics indicate that this scheme will add 0.74 cents/gal to the cost of gasoline production. An alternative involves the hydrodesulfurization of the catalytically cracked gasoline rather than the feedstock. This scheme is estimated to add 0.95 cents/gal to the cost of gasoline production. (Author summary modified)

50319 **APTIC NO. 75064**

Moore, D. O., Jr., J. M. Peters, W. S. Alper, E. Rosen, and J. R. Burke

EVALUATION OF SULFUR DIOXIDE EMISSION CONTROL OPTIONS FOR IOWA POWER BOILERS (FINAL REPORT). *Kellogg (M. W.) Co., Houston, Tex., Environmental Protection Agency Contract 68-02-1308, Program Element 1AB013, Task 3, ROAP 21ADD-079, Rept. EPA-650/2-74-127, 331p., Dec. 1974. 19 refs.*

NTIS: PB 239496/AS

Sulfur dioxide emission control strategies for major coal-burning boilers in Iowa were evaluated in terms of cost-effectiveness. The options considered included: the use of low-sulfur eastern and western coals, mechanical coal cleaning, and flue gas desulfurization. Major utility boilers were surveyed, probable coal sources were determined, and alternate transportation routes were defined. Coal cleaning plant and flue gas desulfurization design studies were performed, and a linear computer program model was developed to determine minimum cost strategies for meeting emission levels corresponding to no-control and control to 5.0, 3.1, and 1.2 lb SO2/MM Btu. Flue gas desulfurization was the most cost effective only for the most restrictive emission level (1.2 lb/MM Btu) and when the supply of low-sulfur coal is limited. Importing low-sulfur coals or combinations of mechanical coal cleaning and low-sulfur coal import gave the lowest cost for all other cases. The conclusions are not generally applicable to other states because of differences in the distances low-sulfur coal must be transported, the ashability characteristics of local coals, the size of the power plants, and the power plant network in Iowa as opposed to other states. (Author abstract modified)

50320 **APTIC NO. 72144**

Japan Environmental Agency

PROGRESS IN OTHER AREAS OF ENVIRONMENTAL ADMINISTRATION. *In: Quality of the Environment in Japan. p. 194-204, 1974.*

The financing of pollution control costs in Japan is discussed. The Environmental Pollution Control Service Corporation is in charge of programs for land development and construction of public facilities for the prevention of environmental pollution, making loans for the installation of anti-pollution equipment, and performing other related activities. There were 545 loans issued in 1973 for facilities including smoke and soot treatment, dust treatment, and odor control. Commodity taxes are reduced for a given time period on low-polluting automobiles that meet the government s exhaust standards scheduled to go into effect in 1975. Local taxes on acquisition of such automobiles will also be reduced. As of Oct. 1, 1973, 799 local governments concluded pollution control agreements with a total of 5097 industrial firms. Local governments made 3968 loans for pollution control facilities.

1973

50321 **APTIC NO. 71533**

Selden, Maury and Lynn G. Llewellyn

STUDIES IN ENVIRONMENT - VOLUME 1 - SUMMARY REPORT. *Homer Hoyt Inst., Washington, D. C. and National Bureau of Standards, Washington, D. C., Technical Analysis Div., Environmental Protection Agency Grant 801473. Program Element 1HA098, Rept. EPA-600/5-73-012a, 116p., Dec. 1973. 635 refs.*

GPO

Synopses of reports on environmental topics prepared by students participating as Environmental Protection Agency summer fellows are presented. The topics covered by the reports include: the quantification of the concept of quality-of-life, the development of an accounting system for allocating pollution produced by industry as a result of consumer demands for goods and the environment, environmental management, and pollution as a function of a community s location. Differentials between center-city and suburban locales for air, noise, water, solid waste, and radiation are investigated, with the pollution in urban areas being then linked to the polluters. The impact of uniform federal enforcement is also analyzed

STANDARDS AND CRITERIA

1975

50322 **APTIC NO. 71728**

Rubin, Edward S. and Francis Clay McMichael

IMPACT OF REGULATIONS ON COAL CONVERSION PLANTS. *Environ. Sci. Technol., 9(2):112-117, Feb. 1975. 4 refs.*

The impact of air and water quality regulations on the design, siting, and economics of coal conversion plants (gasification and liquefaction) is discussed. Potential air pollutants (process-generated and combustion-generated) resulting from coal conversion processes include: particulate matter, sulfur sulfur oxides, reduced sulfur compounds (hydrogen sulfide, carbonyl sulfide, and carbon disulfide), nitrogen oxides, trace metals, hydrocarbons, carbon monoxide, and other gaseous emissions (ammonia, hydrogen cyanide, hydrogen chloride, and odorants). New Source Performance Standards for fossil-fuel-fired steam generators have the clearest implications for coal conversion processes since many such processes require a large on-site boiler plant nominally fired by coal or char. Often, the sulfur content of solid fuels currently designated for these boilerhouses exceeds the Federal New Source Performance Standards. Thus, various alternative control strategies must be evaluated for the control of sulfur from these facilities. Standards for H2S-laden low Btu gas are forthcoming in 1975 and may be much more stringent than existing new source standards for non-gaseous fossil fuel combustion. The implications of New Source Performance Standards for nitrogen oxides and particulates emitted from coal-derived fuels require full-scale demonstration tests for their evaluation. Secondary impacts involving utility requirements for gas-cleaning and effluent treatment systems must also be evaluated. Current national and state ambient air standards are likely to further restrict the design and siting of coal conversion facilities.

50323 **APTIC NO. 71670**

Strelow, Roger

MOTOR VEHICLE POLLUTION CONTROL SUSPENSION REQUEST. EXTENSION OF PUBLIC HEARING. *Federal Register, 40(32):6820-6821, Feb. 14, 1975.*

The extension of public hearings on the request to suspend statutory 1977 light duty vehicle emission standards is announced. Data are requested on these topics: the increase in human exposure to sulfuric acid or other sulfate pollutants anticipated to result from continued use of automotive oxidation catalysts; the health effects associated with exposures to such levels of these pollutants; and the health trade-off between achieving reductions in automotive emissions of hydrocarbons, carbon monoxide, and other possible substances through application of oxidation catalyst emission control systems while incurring increased exposures to emissions of sulfate compounds or other emission products. Testimony is sought on the feasibility of achieving interim reductions in automotive sulfate emissions levels through the selective blending by refineries of low sulfur gasoline components into unleaded grades required by catalyst- equipped vehicles and the possible allocation of such low sulfur unleaded gasoline supplies to geographical areas anticipated to experience the greatest impact from automotive sulfate emissions.

1974

50324 **APTIC NO. 68069**

Hattori, Hisao

STATUS QUO OF THE PREVENTION OF NITROGEN OXIDES. *(Chisso sankabutsu jokyo no genjo). Text in Japanese. Kagaku Kogyo (Chem. Ind.), 25(10):1123-1127, Oct. 1974.*

The environmental standard for nitrogen dioxide set by the Environmental Agency in May 1973 is less than 0.02 ppm calculated as the average of the values measured every hour in a whole day. This standard is considered to be met in an area if 98% of the total values measured throughout the year are less than 0.02 ppm. Measurements must be made by means of absorption photometry using Saltzman reagent. The emission standard for NO2 should be calculated from the environmental standard. A committee studying the control of nitrogen oxide emission has stated that NOx concentration in ordinary gas should be reduced to 1/6 to 1/10 of the present level if the current environmental concentration and projected increase in the consumption of raw fuels are taken into consideration. A policy of reducing the amount of total exhaust must be enacted to attain the environmental standard. Although there are large differences in sources of emission in different areas the Environmental Agency estimated sources of emission in 1975 in the Tokyo Bay. In connection with mobile sources of NOx the Environmental Agency is tackling the vehicle exhaust standard as a concrete objective. The ultimate end is based on the Japanese version of the Muskie law. Automobile makers must prepare to meet a 1.2 g/km exhaust standard for 1975.

50325 **APTIC NO. 71738**

Kaiser, R. E.

ANALYSIS IN ENVIRONMENTAL PROTECTION. *(Analytik im Umweltschutz). Text in German. Fresenius Z. Anal. Chem., 272(3):186-195, 1974. 8 refs.*

Definitions of terms are presented and proposals are made for a standardized system of measurement and a standarized acceptance and evaluation of results in environmental analysis. For expression of the results of measurements reproducible averages in mass percent should be used rather than the ambivalent ppm. Todays analytical methods for environmental pollutants permit the determination of almost 1000 substances in parallel, results are available within seconds to minutes, and levels of 1 times 10 to the -6th power mass percent + or - 2 times 10 to the -8th power % are still detectable. Gas chromatography is the most suitable method for determination of single substances or complex substance mixtures in the range of 100 to 10 to the -13th power mass percent. It is particularly suitable for organic substances but it can also be used for compounds with well over 75% of all existing elements. Several examples of its application for air quality and water quality measurements are given.

50326 **APTIC NO. 72103**

Murase, A. and J. Kobayashi

A CALCULATING TECHNIQUE OF LIMITING NITROGEN OXIDES EMISSION DENISTY. *(Kawasaki-shi ni okeru chisso sankabutsu chiku betsu kyoyo haishutsu soryo no sanshutsu no shuho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):299, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 154.)*

The allowable emission quantity of nitrogen oxides for the achievement of environmental standards was determined based on NOx emission data compiled for 1972 in Kawasaki city. The 1-hour value and yearly average value were obtained by dispersion calculations. The city was sectioned into a 1-km grid, and the emission quantity from each source (mobile and stationary) during Dec. to March and April to Nov. at different time zones were obtained. An SRI model of mobile sources and a plume model for stationary sources were used. The national environemental standard of 0.016 ppm was aimed for, and an intermediate value of 0.04 ppm was set for 1978. The increase in fuel consumption by 1978 was estimated to be 1.34 times the 1972 consumption for stationary sources and 1.157 for mobile sources. The ratio of stationary and mobile sources was 2:1 and out of 0.04 ppm, 0.027 ppm was assigned to stationary sources and 0.013 ppm was assigned to mobile sources. The necessary amount of reduction in NOx emission is determined.

50327 **APTIC NO. 71771**

CONTROL OF AIR POLLUTION: EXHAUST EMISSION STANDARDS FOR MOTOR VEHICLES. *Intern. Digest Health Legislation, 25(3):585, 1974.*

The standards introduced by Crown Order No. 214 (May 27, 1970) amending Order No. 729 (Dec. 13, 1968) concerning devices to restrict air pollution from motor vehicles are to remain valid for vehicles up to the 1975 model year by Crown Order No. 546 (Oct. 27, 1972). For 1976 and subsequent model year vehicles, emissions must not exceed 24.2 g/km for carbon monoxide, 2.1 g/km for hydrocarbons (calculated as methane), and 1.9 g/km for nitrogen oxides (as nitrogen dioxide), as measured under test conditions prescribed by Federal authorities in the United States for 1973 model year light-duty motor vehicles. Crown Order No. 596 (Dec. 1, 1972) reproduces the exhaust emission standards laid down in Crown Order No. 214 and prescribes that motor vehicles with a cylinder volume of at least 0.8 l or an effective power of at least 30 horsepower and a total weight not exceeding 2.5 metric tons must be equipped with the following: in the case of petrol-driven engines, an effective device preventing the escape of gases through the engine crankcase and a device for limiting exhaust gas pollutants; in the case of diesel engines, an effective device for preventing the formation of markedly colored or opaque exhaust gases at times other than during starting or changing gears and a sealing system for the fuel-injection pump. Other provisions in the Order specify the procedures for verifying compliance with the requirements and empower the Traffic Safety Administration to issue detailed regulations concerning motor vehicle inspections and the like.

50328 **APTIC NO. 72145**

Japan Environmental Agency

DEVELOPING BASIC MEASURES FOR ENVIRONMENTAL PROTECTION. *In: Quality of the Environment in Japan. p. 210-212, 1974.*

The establishing and tightening of environmental air quality standards in Japan are described. Environmental standards exist for sulfur dioxide, carbon monoxide, suspended particulate matter, nitrogen dioxide, and photochemical oxidants. Standards for hydrocarbons are scheduled for 1974. Consideration will be given to environmental standards for lead and fluorine compounds, and consideration of environmental standards for aldehydes and vanadium will be initiated. Future environmental standards will consider protection of the entire living environment, including preventing damage to plant life. Environmental impact assessment techniques will be developed and include urban air pollution.

50329 **APTIC NO. 72150**

Japan Environmental Agency

AMBIENT AIR QUALITY STANDARDS (APPENDIX 1). *In: Quality of the Environment in Japan. p. 242-245, 1974.*

The Japanese ambient air quality standards are listed for five criteria pollutants and noise. The daily average of hourly values for sulfur dioxide cannot exceed 0.04 ppm, the hourly values cannot exceed 0.1 ppm. The average hourly values of carbon monoxide in 8 consecutive hours cannot exceed 20 ppm, and in 24 consecutive hours it cannot exceed 10 ppm. The average of hourly values of suspended particulate matter as measured in 24 consecutive hours must be 0.10 mg/cu m or less. Hourly values must be 0.20 mg/cu m or less. An interim target date was set for nitrogen dioxide. The number of days in which the daily average of hourly values does not exceed 0.02 ppm more than 60% of the time must be achieved within 5 yr, and the environmental standard shall be achieved within 8 yr. The hourly values of photochemical oxidants shall not exceed 0.06 ppm.

50330 **APTIC NO. 72151**

Japan Environmental Agency

EMISSION STANDARDS (APPENDIX 2). *In: Quality of the Environment in Japan. p. 245-251, 1974.*

The emission standards in Japan are presented for sulfur oxides, soot and dust, harmful substances, nitrogen oxides, odors, and motor vehicles. Sulfur oxide emission standards vary according to the region, and are tabulated for seven areas. There are special standards for newly constructed facilities. The soot and dust standards are listed for boilers, incinerators, and furnaces. At all facilities the standards for cadmium and its compounds is 1.0 mg/cu m N, 30 mg/cu m N for chlorine, and 80 mg/cu m N for hydrogen chloride. The standards for fluorine, hydrogen fluorine, silicon fluoride, lead, and nitrogen oxides vary by type of facility. Regulatory standards are listed for these odors: ammonia, methyl mercaptan, hydrogen sulfide, dimethyl sulfide, and trimethylamine. Exhaust emission standards are tabulated for carbon monoxide, hydrocarbons, and nitrogen oxides from trucks and automobiles.

1973

50331 **APTIC NO. 71991**

Subcommittee on Air and Water Pollution

AUTOMOBILE EMISSIONS STUDY. *In: Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part 2. 93rd Congress (Senate), First Session, Serial 93-H9, p. 465-470, May 14, 17, 18, and 21, 1973. 5 refs. (Hearings before the Committee on Public Works.)*

An elaboration of the Environmental Protection Agency s reply to the automotive industry concerning criticism of the automotive emissions standards is presented. Topics covered include: criteria for establishing air quality standards and emission standards, the effects of automobile emissions on humans and vegetation, commercial engines that meet federal standards, an analysis of the American auto manufacturers approach to emission control, the balance of costs versus gains to the public resulting from automotive emission standards, and the systems analysis approach for determining appropriate trade-offs in emission control. Human health effects are tabulated for ozone, nitrogen oxides, sulfur dioxide, carbon monoxide, hydrocarbons, and particulates. Vegetation effects are summarized for SO2, O3, fluorides, ethylene, and nitrogen dioxide.

50332 **APTIC NO. 75073**

National Academy of Sciences, Washington, D. C., Committee on Motor Vehicle Emissions

NAS REPORT OF TECHNOLOGICAL FEASIBILITY OF 1975-76 MOTOR VEHICLE EMISSION STANDARDS. A CRITIQUE OF THE 1975 FEDERAL AUTOMOBILE EMISSION STANDARD FOR CARBON MONOXIDE. NATIONAL ACADEMY OF SCIENCES (PANEL REPORT). *Office of Air and Water Programs Contract 68-01-0402, 67p., May 1973. 44 refs.*

NTIS: PB 224861

A study of the basis for the Federal motor vehicle carbon monoxide emission standard for 1975 and later model year vehicles is presented. Topics covered in the study include: the occurrence, properties, and fate of atmospheric CO; principles of formation and control of CO; estimations of CO emissions and measurements of ambient CO concentrations, the effects of CO on plants and certain microorganisms; experimental and epidemiological studies of the effects of CO on human health; the computation of emission standards; the selection of present CO air quality data and background concentration data for rollback computations; the selection of a growth factor to be used in rollback computations; and rollback calculations involving reduction percentage and emission standards.

50333 **APTIC NO. 75075**

National Academy of Sciences, Washington, D. C., Committee on Motor Vehicle Emissions

NAS REPORT ON TECHNOLOGICAL FEASIBILITY OF 1975-76 MOTOR VEHICLE EMISSION STANDARDS. A CRITIQUE OF THE 1975-76 FEDERAL AUTOMOBILE EMISSION STANDARDS FOR HYDROCARBONS, AND OXIDES OF NITROGEN (FINAL REPORT). *Office of Air and Water Programs Contract 68-01-0402, 77p., May 1973. 37 refs.*

NTIS: PB 224863

Studies on the basis for the Federal motor vehicle emission standards for hydrocarbons and nitrogen oxides applicable to 1975 and later model year vehicles are summarized. The studies include the relationship between hydrocarbon and NOx emissions and oxidant formation, the air quality standard for oxidants, the atmospheric concentrations of non-methane hydrocarbons required to achieve this oxidant standard, the atmospheric concentrations of NOx required to achieve the air quality standard for nitrogen dioxide, the automotive emis-

sions of hydrocarbons and NOx necessary to achieve these air quality standards, growth factors, and rollback computations.

LEGAL AND ADMINISTRATIVE

1975

50334 **APTIC NO. 72341**

Hansen, Douglas C.

WASHINGTON. PROPOSED REVISIONS TO IMPLEMENTATION PLAN. *Federal Register, 40(54):12521, March 19, 1975.*

Proposed revisions to the implementation plan for the state of Washington are announced. Additional source categories are proposed: incinerators (other than woodwaste) designed for a capacity of 100 lb/hr or more; stationary sources for which a Federal standard of performance applies; any source which emits a contaminant subject to a national emission standard for hazardous air pollutants; and sawmills. A notice of construction is required prior to constructing any source listed in WAC 18-04-100 and any source for which a Federal standard of performance was promulgated prior to the filing of the notice of construction. The Department of Ecology will review the notice of construction to determine if reasonable emissions control is planned to determine its effect on air quality. The kraft pulping mill regulations were expanded to include other mills using related chemical processes.

50335 **APTIC NO. 72254**

Hansler, G. M.

MASS TRANSIT PRIORITY INCENTIVES IN THE STATE OF NEW JERSEY. ACTION ON EMPLOYER S PROVISIONS. *Federal Register, 40(15): 3465-3466, Jan. 22, 1975.*

Environmental Protection Agency approval is granted for 93 revised New Jersey transportation control plans. The revisions to the plans deal with the employer s provision for mass transit priority incentives and require each employer who maintains 400 or more employee parking spaces to submit an adequate transit incentive program designed to encourage the use of mass transit and carpooling by his employees. A listing is given of those employer plans which are approved. Copies of the plans are available for public inspection.

50336 **APTIC NO. 72343**

Hansler, G. M.

NEW JERSEY IMPLEMENTATION PLAN. PROPOSED COMPLIANCE SCHEDULES. *Federal Register, 40(52):12112-12113, March 17, 1975.*

Proposed compliance schedules for the state of New Jersey are announced. Dates representing phase pollution abatement commitments are on every schedule submitted by a subject source. It is the succession of dates identifiable to a subject source that is proposed to be adopted as the official compliance schedule for such source. One approved, these schedules will constitute revisions to the New Jersey implementation plan. Approval of these schedules is necessary to make final compliance dates associated with such schedules federally enforceable. The public interest will be protected by the inclusion of the final compliance date for such sources, which will become enforceable immediately upon approval of the proposed schedule for that source

50337 **APTIC NO. 71860**

Hauser, Thomas R. and S. David Shearer

BETTER AIR QUALITY DATA: A DETAILED LOOK AT EPA S NEW AMBIENT AIR MONTIORING EQUIVALENCY REGULATIONS. *Preprint. Environmental Protection Agency, Research Triangle Park, N. C., Quality Assurance and Environmental Monitoring Lab., 23p., Jan. 22, 1975.*

The new ambient air monitoring equivalency regulations are described. They consist of three subparts. Subpart A contains the general requirements that must be met by an analytical method to be considered for designation as a reference or equivalent method. These requirements place the primary responsibility for conducting the tests required for determination of reference or equivalent methods on the applicant who ordinarily is the manufacturer of that method. All pertinent information that must be submitted to the Environmental Protection Agency by an applicant desiring an equivalency or reference method determination is specified. Procedures for processing any application are included. Subpart B lists procedures for testing certain performance characteristics of automated analyzers. This subpart replaces all previous performance specifications and testing procedures listed in 40 Code of Federal Regulations Parts 50 and 51. Subpart C gives the procedures that must be followed for determining a consistent relationship between candidate equivalent hods and reference methods.

50338 **APTIC NO. 72379**

Inhaber, Herbert

A CANADIAN VIEW OF MONITORING ACTIVITIES. *Environ. Sci. Technol., 9(3):206-209, March 1975. 5 refs.*

The Canadian monitoring program is evaluated based on the Pollution Monitoring Directory (PMD) of the Smithsonian Institute. The PMD lists 33 parameters of pollution, some of which are actual pollutants such as nitrogen oxides and DDT. Others are primarily indicators of environmental quality such as pH and biochemical oxygen demand. The number of Canadian programs for detecting each parameter, the number of worldwide programs for that parameter, and the Canadian percentage of the total are tabulated. The parameters most often measured in Canadian programs are suspended particulate matter, mercury, salts of alkali metals, heavy metals, pH, and sulfur oxides. Canadian programs form 1/6 or more of world programs for measurements of biochemical toxins, Hg, and petroleum hydrocarbons. Programs dealing with air and fresh water make up about half of all the 124 Canadian programs. There are 3756 sites for monitoring the air which is 0.208 of the worldwide total. Typical data covered in the PMD are illustrated by the parametal monitoring of airbone sulfur dioxide and sulfates.

50339 **APTIC NO. 72286**

Kumbayashi, Minoru

LEGISLATION OF POLLUTION CRIME. *(Kigyo himitsu reijizai to kogaizai). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), vol. 1975:49-53, Jan. 1975.*

Pollution criminal law prevents emitting and dumping of harmful substances into the environment. According to the existing law, an intentional offender can be sentenced to up to 3 yr in jail and fined up to $1,000,000. An unintentional offender can be sentenced to up to 2 yr in jail and fined up to $660,000. A new pollution criminal law which was drafted to replace the existing one proposed up to 5 yr in jail for intentional offenders and up to 3 yr in jail and $1000 fine for unintentional offenders. Legally and practically, many problems exist in enforcing the pollution criminal law.

50340 **APTIC NO. 71901**

Larsen, Ralph I.

RELATING AIR QUALITY DATA TO EFFECTS, STANDARDS, AND NEEDED SOURCE REDUCTIONS. *Preprint. Air Pollution Control Assoc., Pittsburgh, Pa., Southwest Section, 16p., Feb. 25, 1975. 12 refs. (Presented at the Ambient Air Quality Measurements Conference, Austin, Tex., March 10-11, 1975.)*

The use of air management to relate air quality data to effects, standards, and needed source reductions is described. Air management involves these steps: determining the effects of various pollutant concentrations and exposure duration on people, plants, and property; deciding which effects to prevent; selecting air quality goals or standards that will prevent these effects; measuring and evaluating ambient air pollutant concentrations; calculating overall emission reductions needed to achieve selected ambient air quality goals in a specific geographic area; deciding how much each source could be permitted to emit and still achieve the desired ambient air quality goals; selecting or developing means for achieving the necessary emission reductions; deciding the date by which each source type should be controlled; setting emission standards; enforcing emission standards; and continuing to monitor pollutant sources and ambient atmosphere to ensure that air quality goals are being achieved.

50341 **APTIC NO. 72322**

Morris, A. R.

IMPLEMENTATION PLANS. MARYLAND: PROPOSED REVISION. *Federal Register, 40(60):13521-13522, March 27, 1975.*

Proposed revisions to the Maryland implementation plan submitted to the Environmental Protection Agency on April 24, 1974 and December 11, 1974 are outlined and submitted for public comment. The revisions concern such topics as gasoline transfer vapor control, dry cleaning solvent evaporation and control, the prohibition of photochemically reactive organic solvents, changes to the air pollution episode criteria, changes in particulate matter regulations dealing with pathological incinerators, the definition of photochemical oxidants, additions and changes to the methods for measurement of ambient air quality, additions to regulations dealing with sulfur oxides from fuel burning, changes in nitrogen oxide emission regulations for nitric acid plants, emission and dust collector performance standards, and a delection of the 0.5% sulfur control requirements for residual fuel oil burning. Copies of the proposed revisions are available for public inspection.

50342 **APTIC NO. 71551**

Niemeyer, L. E. and J. L. Dicke

ENVIRONMENTAL PROBLEMS: REQUIREMENTS FOR INTERDISCIPLINARY TRAINING. *Preprint, World Health Organization, Geneva (Switzerland) and International Assoc. of Meteorology and Atmospheric Physics (Ontario), 10p., 1975. 10 refs. (Presented at the Education Training Meteorology and Meteorological Aspects of Environmental Problems Symp., Caracas, Venezuela, Feb. 1975.)*

The meteorological aspects of environmental problems and educational courses for interdisciplinary training are discussed. All air pollution problems involve atmospheric processes or properties. The degree of pollution is a function of the horizontal and vertical wind movement, the presence or absence of inversions, and the presence of other meteorological phenomena. The complex interactions of chemicals in the atmosphere is governed by the degree of turbulence and by the presence or absence of sunlight. The Air Pollution Training Institute was established which offers a variety of technical and administrative courses in the field of abatement and pollution control. Specific courses are described on all aspects of air pollution meteorology. Correspondence courses, videotapes, and self-instructional manuals are available.

50343 **APTIC NO. 72325**

Nishimata, S.

MORBIDITY OF AIR POLLUTION-RELATED RESPIRATORY DISEASE. *(Hairo no sora shita ni aegu). Text in Japanese. Ao to Midori (Blue Green), 4(1):64-69, Dec.-Jan. 1975.*

The morbidity of respiratory diseases, infantile bronchial asthma, and senile pulmonary emphysema developing from bronchial asthma were surveyed in to eastern Tokyo and compared with patient income levels in order to examine the Japanese system of compensation for air pollution victims.

50344 **APTIC NO. 72350**

Okawa, Mamoru

TELEMETER SYSTEM. PART I. TELEMETER SYSTEM FOR AIR POLLUTION SOURCES IN CHIBA PREFECTURE. *(Teremeta sisutemu. Sono-1. Chiba-ken Taiki Osen Hasseigen tere meta sisutemu). Text in Japanese. Idemitsu Sekiyu Gijutsu Idemitsu Pet. J., 18(1):49-59, 1975.*

The air pollutant source monitoring telemeter system which has been in operation since June 1974 in Chiba is described in detail. The objectives of monitoring, the planning process, and location of factories selected for monitoring are described. The data monitored are fuel consumption amount, amount of raw material used, sulfur content in fuel and raw materials, emission quantity of exhaust gas, flow rate of exhaust gas, sulfur oxides concentration in exhaust gas, nitrogen oxides concentration in exhaust gas, residual oxygen in exhaust gas, and amount of power generated. The telemeter system is illustrated with descriptions, schematic diagrams and photographs of equipment, and data processing procedures are explained with equations and symbols used and emergency procedures.

50345 **APTIC NO. 72291**

Oshio, Toshiki

PREVENTION OF POLLUTION BY ENVIRONMENTAL EFFECT ASSESSMENT. *(Kankyo eikyo hyoka niyoru kogai no mizen boshi ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(1): 1-11, Jan. 1975.*

The Environmental Impact Assessment Subcommittee was established in June 1973 within the Pollution Prevention and Plan Committee of the Bureau of Environment. An interim report on the guidelines for the application of environmental impact assessment was given in June 1974. The effects of public facilities and businesses such as roads, airports, navigation, recreation facilities, electric power stations, and forestry on the environment were evaluated and determined. In addition to plans for development and emitting source conditions, natural environmental conditions must also be taken into consideration. The National Environmental Policy of the U. S., which gives concrete environmental impact assessment, was given as reference.

50346 **APTIC NO. 72085**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. TENNESSEE: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(16): 3570-3571, Jan. 23, 1975.*

Compliance schedules for various stationary industrial sources that were submitted by the state of Tennessee and approved by the Environmental Protection Agency Administrator are listed. The schedules are already in effect under Tennessee law, and the EPA approval reaction imposes no additional regulatory burden on the affected facilities. The schedule listing is given according to source, location, state regulation involved, date of adoption, effective date, and final compliance date.

50347 **APTIC NO. 72195**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. KANSAS: APPROVAL OF PLAN REVISIONS. *Federal Register, 40(68):15879- 15880, April 8, 1975.*

Implementation plan revisions submitted by the state of Kansas and approved by the Environmental Protection Agency are outlined. The regulations affected are amended to provide for regulatory control of small-sized incinerators (less than 200 lb/hr capacity) which were previously exempted. The provision in the compliance schedule regulations that a source can request permission to operate in non-conformance with an applicable emission standard is deleted. Sources which are in violation of an applicable emission standard and cannot comply within the appropriate time period must request a variance. All open-burning operations, other than those specifically exempted by Regulation 28-19-47 (Exemptions - Open-Burning), must cease operation immediately. A section is added to Regulation 28-19-47 to authorized certain types of open-burning operations associated with land clearing and crop and game management practices.

50348 **APTIC NO. 72249**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. TENNESSEE: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(15): 3444-3447, Jan. 22, 1975.*

Compliance schedules for stationary industrial sources in Tennessee that satisfy the requirements of 40 CFR Part 51 are listed as approved by the Environmental Protection Agency. Each schedule establishes a date by which an individual air pollution source must attain compliance with the emission limitations of the state implementation plan. The schedules are listed according to source, location, regulation involved, date of adoption, effective date, and final compliance date. Many of the schedules include incremental steps toward compliance, with specific dates set for achieving those steps. Copies of the schedules as well as the Tennessee plan itself are available for public inspection.

50349 **APTIC NO. 72250**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. COMMONWEALTH OF PENNSYLVANIA IMPLEMENTATION PLAN; ADMINISTRATOR S RESPONSE TO EXCLUSIVE BUS/CARPOOL LANE STUDY. *Federal Register, 40(18): 3995-3997, Jan. 27, 1975.*

The response of the Environmental Protection Agency Administrator to a Pennsylvania bus/carpool lane study is presented. On the basis of six corridors studied in the Philadelphia area, the Administrator concludes that three appear suitable for bus/carpool lanes: Interstate 95 north of the central business district, I-95 south of the central business district, and a portion of West Chester Pike. In the Pittsburgh area, the Administrator finds that one exclusive bus lane on a portion of West Liberty Avenue, one exclusive bus/carpool on-ramp at Stanwix Street, and one pair of exclusive bus/carpool lanes on a portion of the Parkway East appear suitable. The Commonwealth of Pennsylvania is urged to continue planning for the implementation of the above corridors and routes determined suitable by the Administrator in both the Metropolitan Philadelphia and the Southwest Pennsylvania air quality control regions.

50350 **APTIC NO. 72251**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. ARIZONA; APPROVAL OF COMPLIANCE SCHEDULE. *Federal Register, 40(18):3994, Jan. 27, 1975.*

A compliance schedule submitted by the state of Arizona for the Flintkote Company, Nelson, Arizona is approved by the Environmental Protection Agency Administrator. The schedule was submitted by the state as a revision to the compliance schedule portion of the Arizona plan for the implementation of the national ambient air quality standards. The revision establishes a new date by which the individual air pollution source must comply with the applicable air pollution control regulations which are listed in the schedule. A copy of the complete Arizona state implementation plan and an evaluation report containing EPA s position on the above schedule are available for public inspection.

50351 **APTIC NO. 72252**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS: NEVADA; APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(18): 3994-3995, Jan. 27, 1975.*

Compliance schedule revisions to the Nevada state implementation plan covering United States Gypsum Corporation and the Barold Division of National Lead Industries, Incorporated are approved by the Environmental Protection Agency Administrator. Each revision establishes a new date by which the individual air pollution source must comply with the applicable air pollution control regulations specified in the schedules. Each schedule includes incremental steps towards compliance with the specified regulations. A copy of the complete Nevada state implementation plan and an evaluation report containing EPA s position on each of the schedules are available for public inspection.

50352 **APTIC NO. 72279**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. IOWA: APPROVAL OF PLAN REVISIONS. *Federal Register, 40(68):15879, April 8, 1975.*

Implementation plan revisions submitted by the state of Iowa and approved by the Environmental Protection Agency are outlined. The basis for evaluation of a new or modified direct source is its impact on the attainment and maintenance of National Ambient Air Quality Standards instead of its effect on life and property. Regulations are revised to provide for public availability of emission data and to require the maintenance of emission records by the source. A subsection entitled Emission Reduction Program, is amended to clarify the increments of progress necessary for an approvable emission reduction program. A chapter is added to specify the requirements necessary to obtain qualification in visual determination of the opacity of emissions. The New Source Performance Standards, published December 23, 1971 (40 CFR Part 60), are included as part of the state rules and regulations. Emission standards for nitrogen oxides from the use of fuels and manufacture of nitric acid are deleted. The emission standard for sulfur dioxide from sulfuric acid plants is changed from 6.5 lb/ton of 100% acid produced 30 lb/ton. The interim emission standard for sulfur dioxide (effective January 1, 1974) emitted by fuel-burning sources is deleted.

50353 **APTIC NO. 72323**

Ravan, Jack E.

IMPLEMENTATION PLANS. FLORIDA: APPROVAL OF PLAN REVISIONS. *Federal Register. 40(60):13521, March 27, 1975.*

Revisions to the Florida implementation plan relating to sulfur dioxide emissions are described and offered for public comment. The revisions concern changes in the SO2 emission limits for existing sulfur recovery plants and sulfuric acid plants. In the former case, it is suggested that the present limit of 0.004 lb SO2/lb sulfur recovered from an oil well be changed to an immediately effective limit of 0.08 lb. The present limit of 10 lb SO2/ton of 100% sulfuric acid produced for sulfuric acid plants is also suggested as too stringent, with an emission limit of 29 lb SO2 being proposed as a replacement. The proposed revisions are based on air quality data and dispersion modeling results intended to show that the approval of the relaxed limits will not hinder the attainment and maintenance of the national standards for sulfur dioxide. Interested persons are encouraged to submit written comments on the proposed revisions. The Environmental Protection Agency Administrator s tentative judgment is that the revisions are approvable.

50354 **APTIC NO. 72262**

Shimono, Shozo

SCHEDULED ENFORCEMENT OF OVERALL EMISSION STANDARD FOR AIR POLLUTION. *(Jisshi sareru taiki osen no soryo kisei). Text in Japanese. Kagaku Kojo (Chem. Factory), 19(3):47-51, March 1975.*

The air pollution prevention law lists eleven areas for overall emission standard enforcement. The areas are major industrial cities including Chiba-Ichihara, the Tokyo metropolitan area, Yokohama-Kawasaki, Fuji-Fujimiya, Nagoya-Tokai, Handa, Yokkaichi, Osaka-Sakaichi, Kobe-Amagazaki, the Kurashiki-Mizushima area, and Kitakyushu. These areas were selected because of their high sulfur oxides pollution. An overall emission standard for SOx has been established in the law, whereas that of nitrogen oxides will be established as soon as the investigation of its actual pollution condition is completed. Overall emission standards were established for specfied plants based on the total fuel consumptions of their smoke emitting facilities. The specified plants are those which consume more than a pre-determined amount of fuel (0.1 kl/hr to 1.0 kl/hr depending on area).

50355 **APTIC NO. 71673**

Train, Russell E.

AMBIENT AIR MONITORING REFERENCE AND EQUIVALENT METHODS. NOTICE OF PROPOSED RULEMAKING. *Federal Register, 40(33):7064-7070, Feb. 18, 1975.*

Proposed amendments to ambient air monitoring reference and equivalent methods are announced. It is proposed to amend Part 53 by adding a new 53.16, supersession of reference methods, establishing procedures and criteria applicable to requests that the Administrator specify a new manual reference method, or a new measurement principle and calibration procedure for automated reference methods, by revising the appropriate appendix to 40 CFR Part 50. A supersession of a reference method under the proposed 53.16 would ordinarily require replacement of existing air monitoring methods within a reasonable period.

50356 **APTIC NO. 72081**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. FLORIDA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(50): 11724-11726, March 13, 1975.*

The approval of compliance schedules for the state of Florida is announced. Each schedule established a date by which an individual air pollution source must attain compliance with the emission limitations of the State implementation plan. Many schedules include incremental steps towards compliance with specific dates set for achieving those steps. All schedules satisfy the requirements of 40 Code of Federal Regulations Part 51 pertaining to compliance schedules, and their approval will not hinder the attainment and maintenance of the national ambient air quality standards.

50357 **APTIC NO. 72253**

Train, Russell E.

MOTOR VEHICLE EXHAUST EMISSION RETROFIT DEVICES. VOLUNTARY RETROFIT EVALUATION PROGRAM. *Federal Register, 40(15):3495-3507, Jan. 22, 1975.*

Notice of the immediate establishment of a voluntary motor vehicle exhaust emission retrofit device evaluation program is given by the Environmental Protection Agency Administrator. The purpose of the program is to provide a standardized and centralized evaluation program to compile technical data on various exhaust emission retrofit devices which might be considered as possible candidates for implementation in one of the several areas for which retrofit control strategies are promulgated. Topics covered in the notice include: program goals, eligibility for participation, the applicant s responsibilities, program protocols, vehicle fleet selection, emission test procedures, durability test procedures, drivability and fuel consumption effects, application and report formats, and retrofit evaluation monitoring by the EPA. Calculation procedures for the evaluations are outlined in appendices to the notice.

50358 **APTIC NO. 72342**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. IOWA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(54): 12508-12509, March 19, 1975.*

The approval of revised compliance schedules for the state of Iowa is announced. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the federally-approved state implementation plan. All schedules include incremental steps toward compliance with the applicable emission limitations. Under Iowa law, the schedules are not enforceable after the date on which the associated variance expires and variances cannot be extended for more than 1 yr. The approval of each compliance schedule is unconditional only as to that part of the schedule covered by the initial variance. Approval of the remainder of the schedule is conditioned upon the state s renewal of the variance in identical form and substance to that included in the schedule submitted to the Environmental Protection Agency.

50359 **APTIC NO. 75069**

Booz, Allen and Hamilton, Inc., Bethesda, Md.

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS. VOLUME 7: PROJECTING COUNTY EMISSIONS. SECOND EDITION. *Office of Air and Waste Management Contract 68-02-1005, Task 4, Program Element 2AH137, Rept. EPA 450/4-74-008, OAQPS 1.2-026, 190p., Jan. 1975.*

A specific and uniform methodology for upgrading existing emission inventories and for forecasting future emissions of air pollutants from point and area sources within small geographical areas (e.g., the county) is described. The techniques presented are designed to be used by state and local air pollution control personnel in compiling baseline data for input to the Environmental Protection Agency Air Quality Maintenance Area program. Pollution projections are based on estimates of economic and demographic growth and are established independently of potential growth in emissions from neighboring counties. The impact of emission abatement regulations and compliance schedules is included in the calculation of net emissions. The procedures allow for the estimation of annual emissions of particulates, sulfur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons from industrial, non-industrial, and transportation sources.

1974

50360 **APTIC NO. 71808**

Amaya, Kazuo

ON EXPANDED REGIONAL OBSERVATION SYSTEMS FOR AIR POLLUTION. *(Taiki osen koiki kanshi shisutemu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):550, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 399.)*

Air pollution data observation and dissemination systems must be strengthened. More monitoring stations must be established.

Participation of the general public in monitoring pollution sources is necessary. Telephone hot-lines between data centers and the general public should be established, so the public can be informed of pollution conditions at any time. Public bulletin boards for plotting pollution sources and conditions are a possibility.

50361 **APTIC NO. 71751**

Arrandale, Roy S.

POLLUTION CONTROL IN FUEL-FIRED TANKS. *Glass Ind., 55(10): 12-13, 23, Oct. 1974.*

Various state regulations regarding the control of industrial stack particulate emissions are reviewed. Allowable emissions based on height of the exhaust stack and distance to the plant s property line versus those based on process feed rate are considered along with various state definitions of suspended and settling particulate. Equations used for calculating effective stack height are also presented. Regulations regarding stack plume opacity are reviewed along with methods for measuring opacity.

50362 **APTIC NO. 72288**

Asano, Yuji

LEGAL CONSIDERATION OF ENVIRONMENTAL POLLUTION. *(Kogai ni kansuru hoteki kosatsu). Text in Japanese. Daito Bunka Daigaku Kiyo (Bull. Daito Bunka Univ.), no. 12:125-140, 1974.*

Industrial polluters have lost all four major pollution cases, including the so-called Yokkaichi asthma case, brought against them by the victims. The Pollution Health Compensation Law passed by the Upper House in September 1973 is based on the polluter pays principle. The air pollution prevention law was revised in 1974 by changing the present concentration control to overall emission control. To reduce the 1975 sulfur oxides concentration in Mizushima to the standard set in 1973, the present overall emission must be cut by 66%. Similarly, the present overall emission in Yokkaichi must be cut to 45% of its value. The environmental standard for nitrogen oxides was set at 0.02 ppm and to achieve the goal in 5 years, NOx concentrations in automotive exhaust and flue gases from power plant boilers and various furnaces must be reduced to 10% of their present values.

50363 **APTIC NO. 75091**

Baldwin, T. E., R. R. Cirillo, A. S. Kennedy, and S. J. LaBelle

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS, VOLUME 13: ALLOCATING PROJECTED EMISSIONS TO SUBCOUNTY AREAS (FINAL REPORT). *Argonne National Lab., Ill., Energy and Environmental Systems Div., Office of Air and Waste Management Interagency Agreement EPA-IAG-D4-0463, Proj. 3, Program Element 2AC129, Rept. EPA-450/4-74-014, Office of Air Quality Planning and Standards 1.2-032, 196p., Nov. 1974. 14 refs.*

NTIS: PB 240252/AS

A methodology for projecting and allocating pollutant-specific emissions to areas that are smaller than counties is described. The techniques advanced rely on the development of demographic and economic projections that are used as surrogates to forecast source-specific emissions resulting from residential fuel combustion, transportation, commercial and institutional fuel combustion, industrial processing and fuel combustion, and solid waste incineration. Procedures for allocating emissions to large subcounty areas (e.g., municipalities, townships, census tracts and/or regional planning activities) are treated first. Total emissions from each source are then apportioned to square cells in a master grid system. Emissions allocated to these cells in a master grid system are the final output of this technique and can be used as input for thye purpose of modeling air quality. A test of the procedures is applied to Fulton County (Atlanta), Georgia; procedures yielding the most refined estimates of emissions allocated to subcounty areas are outlined in two appendices.

50364 **APTIC NO. 71598**

Baum, Fritz

MEASURES TAKEN TO ABATE EMISSIONS FROM WOOD-FIRING INSTALLATIONS. *(Massnahmen zur Verminderung der Emissionen von Holzfeuerungen). Text in German. Gesundh.-Ingr., 95(12):362-363, 1974.*

Recent regulations issued in West Germany on air pollutant emissions from wood-firing facilities, and measures to be taken to abate such emissions are outlined. Small facilities with thermal capacities not exceeding 19,000 kcal/hr must be operated smokeless, which can be achieved by the combustion of dry wood. The dust, soot, and tar concentration in the waste gases of wood-firing equipment with capacities over 19,000 kcal/hr is limited to 150 mg/N cu m in the manually fed equipment, and to 300 mg/N cu m in mechanically fed facilities. The dust emission is expected to be limited to 150 mg/cu m, related to 13% oxygen by volume, for facilities with capacities greater than 950,000 kcal/cu m. Also, such facilities will be subject to authorization. Cyclone type separators, while being efficient in the separation of dust, have low efficiency for finely dispersed, lightweight soot as generated by wood-firing equipment. Air pollutant emission from wood-firing equipment can be substantially abated by the use of dry wood in preheated furnaces, by uniform distribution of the material over the grates, and by continuous feeding and air blow.

50365 **APTIC NO. 71599**

Baum, F.

CONTROL MEASUREMENTS AND DOMESTIC AND SMALL-SCALE INDUSTRY FIRING EQUIPMENT IN WEST GERMANY. *(Kontrollmessungen an Feuerungsanlagen im Bereich Hausbrand und Kleingewerbe im gesamten Bundesgebiet). Text in German. Gesundh.-Ingr., 95(12):363, 1974.*

The Aug. 1974 regulation issued in West Germany on low-capacity firing equipment with evaporative or atomization burners for liquid fuels, and for firing equipment for solid fuels is outlined. The regulations affecting household and trade firing equipment are justified by the great number of such facilities, and consequently their substantial contribution to overall air pollution. Small evaporative oil burners as used mainly in households are subject to prototype test only, while fuel oil firing equipment with larger capacities are subject to periodical control measurements of soot and oil emissions. Also, a minimum carbon dioxide concentration in the flue gases of such firing equipment is required. Firing equipment for solid fuel either must use smokeless fuel, or be designed as universal slow-burning furnaces.

50366 **APTIC NO. 71876**

Beery, W. T.

SUMMARY OF SECOND APCA GOVERNMENT AFFAIRS SEMINAR. CLEAN AIR AND ENERGY - WHAT NEXT? *Air Pollution Control Assoc., Pittsburgh, Pa., Proc. Second Air Pollution Control Assoc., Gov. Aff. Semin., Clean Air Energy - What Next?, Washington, D. C., 1974, 72p. (March 27.)*

A summary of papers dealing with air pollution control in relation to energy production and transportation is presented. Topics covered include: the effects of air pollution control devices on automobile fuel economy, state transportation control plans, land use planning, the goals of the Clean Air Act and air quality standards, Environmental Protection Agency activities regarding the establishment and enforcement of mobile and stationary source controls, the effect of emission standards on energy availability, various coal and fuel oil preparation techniques, stack gas desulfurization technology, the economic aspects of funding control programs and installing control equipment, the role of the courts in environmental protection, and future Federal legislative needs.

50367 **APTIC NO. 75100**

Briggs, T. M., M. Overstreet, A. Kothari, and T. W. Devitt

AIR POLLUTION CONSIDERATIONS IN RESIDENTIAL PLANNING. VOLUME I: MANUAL (FINAL REPORT). *PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio, Office of Air and Waste Management Contract 68-02-1089, Rept. EPA-450/3-74-046-a, 179p., July 1974.*

A practical procedure for determining the air pollution exposure of residential developments from air monitoring data is presented. Methods are described for determining the short-term worst case concentrations (at specific site locations) of carbon monoxide from roadways and parking lots, as well as particulate and sulfur dioxide levels resulting from point sources and space heating. A procedure for the conversion of total outdoor pollutant concentrations to indoor levels as a function of building structural characteristics is also described. Outdoor and indoor pollutant levels are compared to air quality standards to determine site acceptability. Design practices to aid the planner in minimizing the impact of air pollution on residents of a development are recommended.

50368 **APTIC NO. 71862**

Cataneo, Robert

OPERATIONAL ASPECTS OF PROJECT METROMEX - AN INADVERTENT WEATHER MODIFICATION STUDY. *Preprint, American Meteorological Society, Boston, Mass., p. 379-381, 1974. (Presented at the Conference on Weather Modification, 4th, Ft. Lauderdale, Fla., Nov. 18-21, 1974.)*

Operational aspects of Project METROMEX, an inadvertent weather modification study in the St. Louis region, are reviewed. The survey s field effort consists of two modes of activity. The first mode involves the continuous collection data from large networks of standard and unique surface weather instruments (250 recording raingages, 250 hailpads, 30 hygrothermographs, seven wind sets, six remote thunder detectors, three cloud cameras, and six raindrop spectrometers). The second mode of operations depends on the weather conditions on a given day and is designed to identify the physical processes of the atmosphere which are responsible for producing the observed urban weather effects and to isolate the factors of the city complex that are causing the observed effects. Activities associated with this second mode of operations include: injection of tracer material into inflow regions of convective storms: measurement of wet deposition versus time: gathering temperature, particulate, and moisture profiles: measurement of cloud characteristics; and the operation of a pilot balloon and radiosonde network. A preliminary data editing procedure is used to process incoming data before final reduction.

50369 **APTIC NO. 72209**

Cirkel, R.

ENVIRONMENTAL LEGISLATION AND THE PAINT INDUSTRY. *(Milieuwetten en de verfindustrie). Text in Dutch. Verfkroniek, no. 47:310-312, Dec. 1974.*

Recent environmental legislation in the Netherlands is outlined. An air pollution tax is imposed on fuels responsible for air pollution, and this revenue is used to finance a national air pollution monitoring network of 225 sampling stations, part of which is already in operation. The network preliminarily monitors sulfur dioxide; ozone and nitrogen oxides will be covered at a later date. Provisions are made to restrict pollutant emissions during critical periods.

50370 **APTIC NO. 71620**

Dreissigacker, Hans-Ludwig, Friedrich Surendorf, and Erich Weber

TECHNICAL DIRECTIVES FOR THE CONSERVATION OF CLEAN AIR. (FIRST GENERAL ADMINISTRATIVE REGULATION TO THE FEDERAL AIR POLLUTION CONTROL AND NOISE ABATEMENT ACT). *(Technische Anleitung zur Reinhaltung der Luft. (Erste Allgemeine Verwaltungsvorschrift zum Bundes-Immissionsschutzgesetz)). Text in German. Staub, Reinhaltung Luft, 34(12):431-433, Dec. 1974. 4 refs.*

The government of the Federal Republic of Germany passed on August 28, 1974 the first administrative regulation to the Federal Air Pollution Control and Noise Abatement Act in the form of a revised edition of the 1964 Technical Directives For Air Pollution Control. First the 1964 immission limits were brought up to the latest state-of-the-art. A table compares the limits of 1974 with those of 1964. For example, the dust immission limits in 1964 were 0.85 (long-term) and 1.3 (short-term) g/sq m/day; the 1974 limits for dust immission are 0.35 (long-term) and 0.65 (short-term) g/sq m/day. The 1974 Directives determine for 50 types of plants the requirements which must be fulfilled in order to obtain an operating license. Of essential importance are the rules concerning monitoring of the emission and immission limits. Authorities have been entitled to intensify monitoring activities. The largest number of regulations in the Directives concern methods and equipment which have been successfully tested in practice.

50371 **APTIC NO. 71507**

Fitch, Russell W.

POLLUTION IN THE METROPOLITAN DENVER REGION. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 1.2, p. 6-15. 4 refs.*

Pollution problems associated with motor vehicle-generated carbon monoxide and photochemical oxidants (hydrocarbons) at high altitude locations such as Denver, Colorado, are discussed: particular emphasis is given to the Colorado Transportation Control Plan submitted to the Environmental Protection Agency. The plan includes: a semi-annual inspection and maintenance program, air bleed retrofit for pre-1968 vehicles, high altitude modification and tuning specifications for 1968-1975 vehicles, designation of mandatory bus/carpool lanes, limitation on the construction of future parking facilities, and the removal of on-street parking in the Denver core area. Also included are improvements in public transit. The EPA promulgated a limitation on gasoline sales to take effect in 1977 if the required reduction in vehicle miles travelled is not achieved through other means.

50372 **APTIC NO. 75087**

Gilbert, Daniel E., Denny E. Wagoner, and Franklin Smith

GUIDELINES FOR DEVELOPMENT OF A QUALITY ASSURANCE PROGRAM. VOLUME XII - DETERMINATION OF PHOSPHORUS IN GASOLINE. *Research Triangle Inst., Research Triangle Park, N. C., Environmental Protection Agency Contract 68-02-1234, Program Element 1HA327, ROAP 26BGC, Rept. EPA-650/4-74-005-1, 66p., Nov. 1974. 17 refs.*

NTIS: PB 240751/AS

An operations manual designed for use by laboratory personnel presents guidelines for developing a quality assurance program for the determination of phosphorus in gasoline by the Federal reference method. Operating practices covered include: equipment selection, calibration, analysis, calculations, and data reporting. Quality assurance procedures outlined include: a functional analysis of the determination method, the collection of information to identify trouble, an independent performance audit, and a data quality assessment. The reference method for phosphorus determination in gasoline is included in an appendix.

50373 **APTIC NO. 75061**

Gruber, Charles W.

REVENUE PRODUCING SYSTEMS IN SELECTED AIR POLLUTION CONTROL AGENCIES. *Cincinnati Univ., Ohio, Office of Air and Waste Management Contract 68-*

02-1454, Program Element 2AH137, Rept. Environmental Protection Agency, 450/3-75-018, 79p., Sept. 1974. 1 ref.

NTIS: PB 239503/AS

Findings of a study of revenue producing systems in nine air pollution control agencies are reported. The revenue producing systems include various permit fees, inspection fees, monitoring/surveillance fees, and specially earmarked taxes. The agencies studied included two state agencies (Oregon and Wisconsin) and seven local agencies (St. Louis, Philadelphia, Chicago, New York, Los Angeles, San Francisco, and Puget Sound). The collection of fees usually presented few problems except where fees were levied against other public entities (e.g., schools, government buildings). Although revenues from fee systems shift some burden from general tax-based funding to the sources of air pollution, only a small portion (averaging 9%) of agency budget requirements came from fees. Fees alone are not major enforcement aids and have little direct effect on pollution control.

50374 **APTIC NO. 71878**

Hassett, Charles M.

ENFORCEMENT PROBLEMS IN THE AIR QUALITY FIELD: SOME INTERGOVERNMENTAL STRUCTURAL ASPECTS. PART II: PROBLEMS OF INTERSTATE COOPERATION. *Ecol. Law Q., vol. 4:63-92, 1974. 147 refs.*

The enforcement of regional air pollution controls is examined in terms of interstate cooperation. Topics reviewed include: the history of the interstate compact, deficiencies that prevent such compacts from operating successfully, and possible remedies for such deficiencies. A detailed model for an interstate compact capable of dealing with multistate, metropolitan air pollution problems is outlined in terms of jurisdiction and structure, accountability and interest representation, financing, and specific powers.

50375 **APTIC NO. 71811**

Ishii, Akio

INVESTIGATIONS ON AIR POLLUTION IN A HIGH-RISE BUSINESS DISTRICT. (NO. 1) SUMMARY OF INVESTIGATIONS. *(Ofisu-biru gai no taiki osen ni kansuru jissoku chosa. (Sono 1) Jissoku chosa no gaiyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):513, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 360.)*

Three building rooftops (A, B, C) in a representative high-rise business district in Tokyo were selected as observation stations for continuous monitoring of SO2 concentrations from December 1972 to March 1973. Buildings A and B contained heating plants which supplied heat to a cluster of buildings surrounding them. Building C stood between a district composed primarily of office buildings, and a district where there was continuous activity regardless of time of day or day of year. The three monitoring machines (A, B, C) were calibrated with respect to machine A.

50376 **APTIC NO. 71534**

Kaiser, Edward J., Karl Elfers, Sidney Cohn, Peggy A. Reichert, Maynard M. Hufschmidt, and Raymond E. Stanland, Jr.

AIR QUALITY MANAGEMENT. *In: Promoting Environmental Quality Through Urban Planning and Controls. North Carolina Univ. Chapel Hill, Center for Urban and Regional Studies, Environmental Proteciton Agency Grant R 801376, Program Element 1HA098, Rept. EPA-600/5-73-015, p. 373-394, 399-402, 429-431, Feb. 1974. 57 refs.*

GPO

The use of urban planning and controls in air pollution management is reviewed. Topics covered include: the national air quality management program, ambient air quality standards, implementation plans, performance standards for new stationary sources, local air quality management programs, regulations restricting the amount of emissions per unit of land area, various zoning practices, economic strategies via tax policies and the like for inducing the attainment and maintenance of air quality standards, and land development in terms of urban renewal and industrial park development. A nationwide emissions inventory (1970) is tabulated for industrial, non-industrial, and transportation sources of carbon monoxide, particulates, sulfur oxides, hydrocarbons, and nitrogen oxides.

50377 **APTIC NO. 71803**

Kojima, S., M. Fujii, and T. Ohse

COMMENTS ON THE ROLE OF REGIONAL AUTHORITIES IN POLLUTION INFORMATION SYSTEMS. *(Chiho kokyo dantai ni okeru kogai joho shisutemu no ichi kosatsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):553, Nov. 1974. Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 402.)*

Factors which are involved in successful operation of large-scale pollution control are discussed. Information on pollution control administration can be divided into three topics: pollution source; environmental conditions; and pollution effects. The actual mechanics of pollution control administration can be divided into seven parts: basic policy formulation, including environmental assessment; regulatory measures; preventive measures; monitoring; relief; aid; and maintenance of environmental standards. Use of electronic computers becomes necessary for keeping track of all relevant data.

50378 **APTIC NO. 69241**

Lindackers, Karl-Heinz, Ludwig Duewel, and Otto-Josef Zuendorf

EMISSIONS FROM THE INDUSTRIAL AND DOMESTIC SECTOR - COLLECTION AND PROCESSING OF DATA FOR THE EMISSION INVENTORY. *(Emissionen aus Industrie und haeuslichem Bereich - Ermittlung und Aufbereitung der Daten fuer das Emissionskataster). Text in German. Preprint, 17p., 1974. 4 refs. (Presented at the Pro Aqua - Pro Vita Conference, Basel, Switzerland, June 10-14, 1974.)*

The collection and processing of information concerning emissions from industries, commercial, and domestic sources for an emission inventory is described. The data bank emission inventory comprises the following data groups: operator data, substance data, source data, equipment data, and emission data. The operator data group contains the following information: the identification number for operator and location, the branch, name and company title, zip code, address, telephone number, and nearest local governmental authority. The substance data group contains the identification number for the substance or substance mixture, its description, its effects, the hydrogen, of carbon, nitrogen, and oxygen atoms of a substance, and six further kinds of atoms of a substance mixture and the mass fraction in % of up to 20 components. The information on all other data groups is listed as well. For every industrial source a schematic illustration and an additional description of the processes with all details on occurring emissions taking place in the industrial plant is furnished. For this experts are required. All emission points and the times at which emissions occur within an individual operating process are recorded. The actual emission concentration in each case is determined either by measurements, by calculation with the aid of reaction equations, or by determination from substance or energy balances. For each case the simplest method is selected which provides sufficiently accurate information. For collection of the data from small enterprises and the domestic sector, the information provided by chimney sweeps can be used. A detailed description of the approach used in this case is given. Although no report is given on the first evaluations of the emission inventory established for Cologne and its surrounding area it is noted that the described method has passed its first crucial test.

50379 **APTIC NO. 71590**

Littlejohn, James L. and George C. Hofer

QUALITY ASSURANCE PROGRAM FOR AMBIENT MONITORING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., Pacific Northwest Internaitonal Section, 23p., 1974. 6 refs. (Presented at the Air Pollution Control Association Pacific Northwest International Section, Annual Meeting, Boise, Idaho; Nov. 17-19, 1974.)*

Recommendations for designing an air monitoring quality assurance program for an industrial or regulatory network are presented. The recommendations are intended to assist in estimating and improving the overall data quality through recording and controlling variables and through performing special checks on a number of random samples for a statistical assessment of data quality. The procedures for recording and controlling variables affecting data quality such as sampling environment, sample conveyance, and calibration materials are presented. Special audit checks are used on random samples for depicting a statistical assessment of the data quality and providing routine information on the performance of personnel and/or equipment. This auditing technique includes: measurement of control samples, interference checks, and data processing checks. The level of frequency at which these audit checks can be employed on a cost effective basis is summarized.

50380 **APTIC NO. 69230**

Odaira, Toshio and Takumi Watanabe

AIR POLLUTION CONTROL SYSTEM OF TOKYO. *(Tokyo-to ni okeru taikiosen kanrishisutemu). Text in Japanese. Denshi Tsushin Gakkai-shi (J. Inst. Electron. Commun. Engrs. Japan), 57(6):680- 696, June 1974. 9 refs.*

The air pollution control system of Tokyo is discussed. The necessity for air resource management, the monitoring systems, control measures, the pollutant management system and functions, the history of air pollution management, an outline of the air pollution control system, details of each part of the system, and the data handling method and future projects are described. The monitoring system of emission sources includes 300 monitoring stations under two systems under one control center. Sulfur dioxide, soot total fuel consumption, electricity consumption where fuel cannot be measured, pollutant emission speeds, the gas temperature, the carbon dioxide, and oxygen residue are measured. The environmental monitoring telemeter system has a control center where all the data are gathered and handled by three data handling systems. Under normal operation conditions, System II operates in the main data treatment system; if it breaks down, the sub-data handling system will be operated. Even when both systems breakdown, System I covering at least 19 stations, will operate. The measurements taken are: SO2, nitric oxide, nitrogen dioxide, carbon monoxide, oxidant, suspended particulates, dusts, hydrocarbons, wind directions and velocities, temperature, humidity, and the ultraviolet rays. These are covered by the general monitoring room, and automobile emission gases and traffic amounts are monitored by an automotive emission monitoring room.

50381 **APTIC NO. 72334**

Ohya, Fumihiko

PREVENTIVE ACTION FOR PHOTOCHEMICAL SMOG IN KANAGAWA. *(Kanagawa-ken ni okeru kokagaku sumoggu no genjo to taisaku). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 10(10):49-58, Oct. 1974.*

Photochemical smogs caused more than 10,000 injuries in 1971 in Kanagawa Prefecture. The number of warnings issued in the same year were 11, but increased to 31 and 30 in 1972 and 1973, respectively. The injuries in the latter two years were much less than those in 1971. Photochemical smog usually occurred between noon and 3 pm on days with wind velocity below 3 m/sec and with temperature higher than 25 C. A new air pollution monitoring system was completed in Sept. 1973, and 8 pollutants including sulfur oxides, airborne particulates, nitric oxide, nitrogen dioxide, carbon monoxide, hydrocarbon, and oxidants were monitored at 72 stations. The degree of pollution for each pollutant was shown at public places in 5 different colors depending on the concentration, and the meteorological conditions were recorded as well. Forecasting of photochemical smog has been carried out every morning at 10 am. A warning, alert, or emergency is issued when hourly oxidants concentration exceeds 0.15 ppm, 0.3 ppm, or 0.5 ppm, respectively.

50382 **APTIC NO. 71514**

Orleans, Miriam, Carol Fox, and Franklin W. Briese

REPORT OF A SURVEY OF COLORADO CITIZENS ORGANIZATIONS CONCERNED WITH ENVIRONMENTAL PROBLEMS. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 2.6, p. 87-94. 48 refs.*

A listing of 48 Colorado citizens organizations dealing with environmental problems is given based on a survey conducted in November 1972. The tabulation includes the address of the organization and the area of environmental interest. Air pollution is the chief environmental concern of 11 of the groups. General activities of the citizens organizations include: increasing public awareness, land use planning, technological development, various political actions, and formal environmental education. Most of the groups engage in more than one type of activity.

50383 **APTIC NO. 72220**

Snyder, Daniel J., III

WEST VIRGINIA. PROPOSED REVISION TO THE INDIRECT SOURCE PROVISIONS. *Federal Register, 39(217):39584, Nov. 8, 1974.*

Notice is issued by the Environmental Protection Agency concerning the receipt of a proposed amendment to the West Virginia state implementation plan which outlines the review for issuing permits for construction, modification, or relocation of any direct or indirect affected sources within the state. The major provisions of the proposal are: a definition of the meaning of indirect source and other associated terms; an outline of timetables for submission of applications and state determination of approval or disapproval for the permit; a time frame for public participation; and procedures for the monitoring of the indirect source after the owner of the source is granted a permit and commences construction of the facility. Public comment on the proposals is requested.

50384 **APTIC NO. 72248**

Stephenson, Earl J.

IOWA. APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(251):45047-45048, Dec. 30, 1974.*

Revised compliance schedules for stationary industrial sources in the state of Iowa are listed as approved by the Environmental Protection Agency. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the state implementation plan. In all cases the schedules include incremental steps toward compliance with the applicable emission limitations. Since under Iowa law the compliance schedule is not enforceable after the date on which the associated variance expires and since variances cannot extend for more than one year, EPA approval of each compliance schedule is unconditional only as to that part of the schedule covered by the initial variance. Approval of the remainder of the schedule is conditioned on the state s renewal of the variance in identical form and substance to that included in the schedule submitted to and approved by EPA. Copies of the compliance schedules and EPA evaluation reports are available for public inspection.

50385 **APTIC NO. 71807**

Tanabe, H., H. Terabe, A. Murase, F. Matsumoto, and T. Inoue

AUTOMATED SOURCE MONITORING SYSTEM FOR SULFUR DIOXIDE IN KAWASAKI CITY (REPORT NO. 3). *(Kawasaki-shi ni okeru hasseiren aryusan gasu jido kanshi shisutemu ni tsuite (Dai-3-ho)). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):551, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 400.)*

The effectiveness of photochemical smog alerts for lowering sulfur dioxide concentrations in Kawasaki City, Japan, on Aug. 11, 1973 is described. Industries took steps to lower SO2 emissions within an hour after receiving word of the alert. Countermeasures mainly consisted of switching to low-sulfur fuel. For the Tashima District, an 11% reduction in SO2 emission was observed. However, since action is taken after high pollutant concentrations are observed, the effect on environmental concentrations is in doubt. Self-monitoring by industries should be instigated, and automated monitoring systems for nitrogen oxides should become a part of photochemical smog countermeasures.

50386 **APTIC NO. 71801**

Tanigawa, T., Y. Hayashi, T. Nakano, and Y. Kanishi

ON MONITORING SYSTEMS FOR POLLUTION SOURCES (REPORT NO. 3). INDUSTRIAL FUEL OIL USAGE AND PHOTOCHEMICAL AIR POLLUTION. *(Hasseigen kanshi shisutemu ni tsuite (Dai-3-ho). Kogyo nenryoyu shiyoryo to kokagaku taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):547, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 396.)*

Daily (3000-4500 kl/day) and hourly (150-200 kl/hr) fuel oil consumption for the month of June were monitored for Osaka City and correlated to photochemical smog alerts. Since smog alerts occurred even on Sundays, when fuel consumption was lowest, automotive exhausts and meteorological influences on the products of oil consumption from previous days must be taken into consideration. It is ineffectual to issue smog alerts after high photochemical oxidant concentrations occur. Suitable warning and forecasting must be geared to the beginning of increasing fuel oil consumption.

50387 **APTIC NO. 72086**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. REVIEW OF INDIRECT SOURCES. *Federal Register, 39(251):45014-45015, Dec. 30, 1974.*

Notice is given that the Environmental Protection Agency is suspending implementation of the review procedures under the indirect source review regulation (40 CFR 52.22(b)) that was promulgated for incorporation into the Clean Air Act implementation plans for 52 states and territories. The regulation as promulgated required affected facilities which commence construction after December 31, 1974 to secure a permit from EPA before proceeding with construction. As a result of the above suspension, no facility which commences construction or modification prior to July 1, 1975 is subject to the Federal indirect source regulation. The suspension has no effect on the applicability or validity of existing state indirect source laws or regulations, nor does it affect state indirect source laws or regulations which may be adopted hereafter.

50388 **APTIC NO. 71508**

White, Gilbert F.

SUGGESTIONS AND RECOMMENDATIONS. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 1.3, p. 16-18.*

Recommendations to alleviate problems posed by carbon monoxide and ozone pollution in Denver, Colorado are outlined. The following actions are suggested: the design of a trial air pollution alert, including pre-alert and post-alert observations; the establishment on a skeleton basis of a system for monitoring reactions to information about air pollution in Denver; the funding of a series of specific epidemiological studies in the Denver area covering associations between various combinations of air pollutants and mortality and morbidity in defined populations; pilot investigations on the relationship of new information on CO and O3 to community decisions involving land use planning, transportation control, and the like; and investigations concerning the relationship between CO and O3 and human judgement in the Denver area, with particular attention being paid to special conditions prevailing at Denver s high altitude.

50389 **APTIC NO. 72194**

Wright, Charles V.

KANSAS. APPROVAL OF AIR QUALITY COMPLIANCE SCHEDULES. *Federal Register, 39(217):39583, Nov. 8, 1974.*

Compliance schedules submitted by the state of Kansas as proposed revisions to its implementation plan and approved by the Environmental Protection Agency are listed. Each approved revision establishes a new date by which the individual industrial source must comply with the applicable emission limitation in the federally approved state implementation. The schedules are listed according to source, location, regulation involved, data adopted, effective date, and final compliance date. Copies of the compliance schedules and EPA evaluation reports are available for public inspection.

50390 **APTIC NO. 71839**

Zangemeister, Christof

SYSTEM ANALYSIS IN ENVIRONMENTAL PROTECTION: FUNDAMENTALS OF SYSTEM ANALYSIS AND EXAMPLE OF TARGETED PROGRAM PLANNING. *(Systemanalyse im Umweltschutz: Grundlagen der Systemanalyse und Beispiel einer Zielprogrammplanung). Text in German. Muell Abfall, 6(8):237-244, 1974. 4 refs.*

The solution of problems concerning more than one subject area is greatly aided by the application of systems engineering. The complex relationships become more understandable, allowing reasonable decisions to be made. The operational steps of the application of systems engineering are explained by an example of target-oriented program planning in environmental protection in Rhineland Palatinate, Federal Republic of Germany. The individual steps are graphically illustrated and are divided into two groups; information collecting and information processing. From the methodological point of view, two complex tasks had to be dealt with: a system of measures had to be worked out leading to the set target of protecting the environment, and this system had to be evaluated. The total problem was outlined and divided into sub-problems so that a direct relationship between environmental protection measures and their contribution to the solution of the sub-problems became apparent. The target area comprises nine sections of environmental protection, e.g., conservation of clean air, safeguarding the water supply and conservation of clean water, protection of soil, flora, and fauna, beautification of the environment, protection of food, protection of man, and protection of the socio-cultural environment.

50391 **APTIC NO. 69551**

California, Univ., Livermore, Lawrence Radiation Lab., National Aeronautical and Space Administration, Ames Research Center, and Bay Area Air Pollution Control District

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. SECOND SEMI-ANNUAL REPORT TO THE NATIONAL SCIENCE

FOUNDATION. NSF Research Grants AG-412, AG-411, and GI 36390, Environmental Earth Sciences TID-4500, UC-11, 127p., Feb. 27, 1974. 62 refs.

NTIS: UCRL-51537

Progress on the development of an air pollution model for the San Francisco Bay area is reported. There are six areas of activity: operational planning, source inventory, photochemistry, model development and validation, model application, and management overview. Historical pollutant data and meteorological data were assimilated and entered into data bank. An initial set of mobile source data was placed in data bank. Observations of pollutant concentrations were collected from 23 fixed sites throughout the district by an aircraft modified and instrumented for air pollution sampling. The stationary source inventory is now complete and contains data on particulates, organics, oxides of sulfur, nitrogen oxides, and carbon monoxide. A critical analysis was made of smog chamber results for basic trends and of current kinetic modeling approaches.

50392 **APTIC NO. 71616**

ENVIRONMENTAL PROTECTION IN POLISH INDUSTRIAL CENTERS. *(Umweltschutz in polnischen Industrierevieren). Text in German. Umwelthygiene, 25(12):277-278, 1974.*

Poland is appropriating increasingly more funds for combating environmental pollution in its industrial centers. The Krakow and Silesian industrial centers have an extension which is surpassed only by the Ruhr area in the Federal Republic of Germany. In Chorzow the annual dust emission limit of 350 tons/sq km is exceeded by 1200 tons/sq km. The solar ultraviolet radiation is here 40% lower and the mortality is higher than in the rest of the country. As preliminary measures, the green zones have been expanded and coniferous trees were replaced by more resistant deciduous trees. Every industrial enterprise is required to clean its waste gases to set standards. The country has developed its own version of electrostatic precipitators which achieve dust collection efficiencies of 90% and more. They are manufactured in Pszczyna. Also, desulfurization processes of coal are being developed. The wet absorption of sulfur dioxide has been introduced in sulfuric acid plants. Reductions of the dust emission by 20,000 tons per annum are planned.

50393 **APTIC NO. 71926**

Dept. of the Environment, London (England), Central Unit on Environmental Pollution

THE MONITORING OF THE ENVIRONMENT IN THE UNITED KINGDOM. *73p., 1974.*

Environmental monitoring activities in the United Kingdom are reviewed. There is currently one major coordinated program for monitoring airborne pollution that extends over the whole country, viz., the National Survey of Smoke and Sulfur Dioxide. The monitoring system comprises some 1200 sampling points which are run by local authorities and coordinated by the Warren Spring Laboratory of the Department of Trade and Industry. Most of the monitoring sites are located in urban areas. Some specialized studies are being conducted on SO2 dispersion over Britain and adjacent parts of mainland Europe. Various agencies are also involved in radioactive monitoring, with measurements of fallout, washout, and radioactive materials in drinking water and milk being coordinated by a joint committee of the Medical and Agricultural Research Councils. Discharges from nuclear research establishments and power stations are monitored by the operators under the inspection of the Department of the Environment and other governmental agencies. Future monitoring plans include the expansion of the National Survey to measure metals and acid particles and pilot-scale measurements of nitrogen oxides, hydrocarbons, and oxidants. An index of monitoring and surveillance activities in Great Britain as of Autum 1973 is provided in an appendix.

50394 **APTIC NO. 72109**

Environmental Protection Agency (Japan)

PLANNING POLICY ON ENVIRONMENTAL POLLUTION CONTROL IN 1974. *(Showa 49 nendo ni oite kojiyoto suru kogai boshi ni kansuru shisaku). Text in Japanese. 72p., 1974.*

The entire report on the 1974 governmental policy concerning pollution controls in compliance with the Pollution Control Law, Article 7, Paragraph 2 and on the policy concerning the preservation and protection of natural environment, submitted to the 72nd Session of the Japanese Diet, is given. The topics reported are the direction of environmental policy, development of basic policies of environmental protection (including envirommental standards for atmospheric pollution, water pollution, noise pollution and soil pollution), environmental assessment, natural environmental protection measures concerning natural parks, animals, birds, forests and others control standards and monitoring system, governmental assistance to pollution control projects, environmental research and surveys, and other environmental protection policies.

50395 **APTIC NO. 72115**

Kobe Municipal Office, Bureau of Environmental Pollution Control (Japan)

AIR POLLUTION CONTROL PROJECT IN KOBE CITY. *(Kobe-shi no taiki kanri keikaku). Text in Japanese. 31p., 1974.*

Envirommental standards for sulfur oxides were formulated in the environmental control plan for Kobe to ensure healthy and comfortable living conditions for residents. The environmental standards are 1-hour average concentration for 24 consecutive hr below 0.04 ppm and 1-hour value below 0.1 ppm. The goal was to be accomplished in 5 yr starting in 1972. Three areas were designated for the control of total sulfur dioxide emission to be accomplished in 3 yr. The three areas, namely, eastern, central, and western areas, had 88.6% of the total smoke emitting facilities and 95.8% of the total SO2 emission of approximately 20,000 tons/yr. The goal for total emission of SO2 in the eastern area was set at 5585 tons/yr and that in the central areas and the western area was 2019 tons/yr and 1823 tons/yr, respectively.

50396 **APTIC NO. 72140**

Japan Environmental Agency

DEVELOPMENTS IN ENVIRONMENTAL ADMINISTRATION. *In: Quality of the Environment in Japan. p. 82-95, 1974.*

The administration of environmental quality in Japan is discussed including appropriations, preventive measures, pollution control programs, and promotion of international cooperation. Budgetary appropriations for 1973 for environmental conservations include these fields: establishment of standards, strengthening control and surveillance, aid for antipollution projects, promoting public works related to pollution control, advancing surveys and research on pollution, bolstering protective measures for pollution victims, and promoting environmental protection measures. Environmental assessment and laws for the screening and production control of chemicals are measures designed to prevent the generation of air pollutants. The basic policy in local pollution control programs include goals, executive deadlines, and control measures. International cooperation is promoted with the United Nations, the Economic Commission for Asia and the Far East, and Organization for Economic Cooperation and Development, and there is bilateral cooperation such as with the United States.

50397 **APTIC NO. 72143**

Japan Environmental Agency

DAMAGE TO HUMAN HEALTH AND COUNTERMEASURES. *In: Quality of the Environment in Japan. p. 166-185, 1974.*

The relief system for pollution-related health damage in Japan is described. The Law Concerning Special Measures for the Relief of Pollution-related Patients was enacted in Dec. 1969 and enables the adoption of administrative relief measures unrelated to the question of civil liability for those suffering from acute health damage. The law provides for the designation of areas of chronic bronchitis and other air pollution-related ailments, Minamata disease, Itai-itai disease, and chronic arsenic poisoning for relief purposes. Victims receive compensation for medical treatment from those responsible for the pollution on the basis of provisions in civil law. A chart showing the designated areas, diseases, and number of officially certified patients is included. Active surveys and studies are underway regarding other areas and ailments where there is suspected damage to health by environmental pollution.

50398 **APTIC NO. 72146**

Japan Environmental Agency

REINFORCEMENT OF CONTROL AND SURVEILLANCE SYSTEMS. *In: Quality of the Environment in Japan. p. 215-218 1974.*

The reinforcement of air pollution control and surveillance systems in Japan is discussed. A total mass emission system is scheduled to be introduced in areas of severe air pollution and where it is difficult to maintain environmental standards. The first regulation is for sulfur oxides. Existing SOx emission standards will be tightened in order to reach and maintain the environmental standards set in May 1973. The areas for which special emission standards for smoke and soot are in effect may be expanded and the list of facilities for which nitrogen oxide emissions standards apply will be increased. Exhaust regulations are planned for 1976. Work for the establishment of standards in measuring various air pollutants which requires monitoring and measurement includes: taking of samples, pretreatment, analysis, and calculation formulas.

50399 **APTIC NO. 72147**

Japan Environmental Agency

PROMOTION OF RESEARCH AND SURVEYS ON ENVIRONMENTAL PROTECTION. *In: Quality of the Environment in Japan. p. 224-231, 1974.*

Research projects in Japan on environmental protection are described. Mechanisms whereby highly concentrated localized pollution occurs will be studied from a meteorological standpoint and a simulation model for photochemical smog will be developed. Research on the measurement and control of nitrogen oxides from stationary combustion sources is scheduled. A durability test program is planned for basic data to be used in preparing standards evaluation methods for various exhaust purification devices that will be installed in automobiles to meet the emission standards scheduled to go into effect in 1975. A module for removal of foul-smelling gases which utilizes layer upon layer of absorptive and reactive macromolecules will be devised, and a study made of how it can be put into practical use. Other projects include soil pollution and pollution due to agricultural chemicals and new pollutants such as polychlorinated biphenyls.

50400 **APTIC NO. 72148**

Japan Environmental Agency

PROMOTION OF ENVIRONMENTAL HEALTH MEASURES. *In: Quality of the Environment in Japan. p. 231-233, 1974.*

Environmental health measures in Japan are discussed including the health damage compensation system and research and surveys on pollution health damage. Victims of pollution related health damage are paid compensation benefits to make redress for health damage. Pollution health and welfare programs will start in 1974 and pollution load surcharge and special surcharges from industries will be instituted to pay these benefits. The characteristics of new chemicals manufactured domestically or imported will be assessed. Surveys are scheduled for health diagnosis standards; health effects of lead smoke, soot, and other forms of composite air pollution; mercury contamination; and organic chlorine compounds.

50401 **APTIC NO. 72149**

Japan Environmental Agency

OTHER MEASURES FOR ENVIRONMENTAL CONSERVATION. *In: Quality of the Environment in Japan. p. 233-239, 1974.*

Future control measures for air pollution in Japan are discussed for soil, farm chemicals, odors, sulfur, industries, and educational institutions. The major soil pollutants are cadmium, copper, and arsenic. A detailed survey on soil pollution prevention was conducted to determine the state of farm land contamination. A survey of 14 farm chemicals will be conducted to determine their retentive properties. Regulations under the Offensive Odor Control Law will add new chemicals to ammonia, methyl mercaptan, and the other three substances currently regulated. Emission standards will be set for smoke stacks and effluents. Naphtha will be temporarily recognized as an emergency fuel in efforts to reduce sulfur emissions. Subsidies are available to public schools whose academic environment is seriously impaired by pollution damage. Newly constructed industrial facilities must indicate the maximum volume of pollutants to be discharged from the plant.

50402 **APTIC NO. 72198**

World Health Organization, Geneva (Switzerland)

HEALTH ASPECTS OF ENVIRONMENTAL POLLUTION CONTROL: PLANNING AND IMPLEMENTATION OF NATIONAL PROGRAMMES. REPORT OF A WHO EXPERT COMMITTEE. *Rept. 554, 57p., 1974. 23 refs.*

A report on the planning and implementation of national programs for the control of environmental pollution is presented, with air pollution being cited as an international problem due to the great distances covered by wind-borne pollutants. Topics covered in the report include: approaches for assessing environmental impact, forecasting potential environmental health hazards, and processing information; risk and benefit considerations in the development of criteria and standards; monitoring and surveillance procedures; prevention and abatement technology; legislation and implementation plans; financing and administering control programs; research and education programs; and international collaboration.

50403 **APTIC NO. 72304**

CONTROL OF AIR POLLUTION, NOISE, AND CERTAIN OTHER NUISANCES. *Intern. Digest Health Legislation, 25(4):757-759, 1974. 3 refs.*

General provisions of a law relating to the control of air pollution, noise, and other nuisances in the German Federal Republic are outlined. The law is designed to ensure against harmful environmental effects resulting from both stationary industrial and non-industrial sources of emissions and mobile sources (motor vehicles, trains, and aircraft). The term air pollution for the purposes of the law is defined to mean changes in the natural composition of the air resulting from smoke, soot, dust, gases, aerosols, vapors, or odorous substances. The law is not applicable to airports or to sources subject to the provisions of the Atom Law.

50404 **APTIC NO. 72394**

CONTROL OF AIR POLLUTION: EMISSIONS OF POLLUTANTS BY THE DIESEL ENGINES OF VEHICLES. *Intern. Digest Health Legislation, 25(4):733-734, 1974. 4 refs.*

The Interministerial Order of February 13, 1974 concerning the European Economic Community type approval of vehicles in relation to smoke emissions produced by diesel engines is outlined. The Order amends the Order of November 12, 1963 with the insertion of three new sections which prescribe those types of vehicles to which smoke emission regulations apply for France. apply for France.

50405 **APTIC NO. 72397**

CONTROL OF AIR POLLUTION: SCHEDULED PROCESSES. *Intern. Digest Health Legislation, 25(4):802-803, 1974. 4 refs.*

Amendments to the Second Schedule of South Africa s Atmospheric Pollution Prevention Acto of 1965 are outlined. The following processes are added to the list of scheduled processes given in the Second Sechdule: metal spray works and macadam preparation works. Amendments are also made to the definition of processes 22, 23, 28, 29, 35, and 39 that are already included in the Second Schedule.

50406 **APTIC NO. 72398**

CONTROL OF AIR POLLUTION: MISCELLANEOUS PROVISIONS. *Intern. Digest Health Legislation, 25(4):816-817, 1974. 2 refs.*

South Africa s Atmospheric Pollution Prevention Amendment Act of 1973 is reviewed in terms of amendments to the Atmospheric Pollution Prevention Act of 1965. The amendments concern regulations involving dust emissions from burning of solid fuels, the inspection and enforcement of vehicular emission levels, and the appointment of smoke control officers. Minor editorial amendments are also made to various sections of the original act.

1973

50407 **APTIC NO. 75070**

Goeller, Bruce F.

SAN DIEGO CLEAN AIR PROJECT: EXECUTIVE SUMMARY. *Rand Corp., Santa Monica, Calif. and San Diego County Environmental Development Agency, Calif., Integrated Regional Environmental Management Project, Environmental Protection Agency Contract 6704-0270-E, Rept. R-1362/1-SD, 29p., Dec. 1973.*

NTIS: N74-31093

Alternative air pollution control strategies for the San Diego Clean Air Project are analyzed in terms of cost-effectiveness and their social impact. Prospective pure and mixed strategies are compared, with effectiveness being calculated primarily in terms of reductions in reactive hydrocarbons (oxidants). The latter are the most troublesome species in San Diego. Three promising fixed-source control strategies are identified: nominal, medium, and maximal. The nominal strategy assumes that only presently mandated rules and controls are to be implemented, while the medium strategy applies additional controls to organic solvent users. The maximal strategy applies additional controls to aircraft. Also identified are 28 promising light-duty motor vehicle retrofit strategies. Each reflects a combination of retrofit devices and an inspection/maintenance program applied to vehicles in specific age classes. Transportation management strategies are designed primarily to reduce light-duty vehicle mileage for long trips since these are responsible for most of the vehicle source emissions. The most promising transportation management strategies are: the imposition of a gasoline tax, rationing, carpooling, and bus system improvements.

50408 **APTIC NO. 72107**

Osaka Prefectural Government, Life and Environmental Dept., Office of Environmental Pollution Control (Japan)

LAWS AND ORDINANCES CONCERNING THE SETTLEMENT OF ENVIRONMENTAL POLLUTION DISPUTES. *(Kogai funso shoriho kankei horeishu). Text in Japanese. 165p., Jan. 1973.*

The laws and ordinances concerning the settlement of environmental pollution disputes issued by the Osaka Prefectural Government are compiled. The contents are environmental pollution dispute settlement law enforcement ordinances, settlement law enforcement regulations, settlement law enforcement notification, ordinances concerning subsidiary agencies, Osaka Prefectural Government environmental pollution investigation committee regulations, investigation committee members, procedural regulations for the investigation committee, and ordinances concerning the bearing of expenses of dispute settlement. The Osaka Prefectural Government ordinances concerning certificate stamp collection, ordinance enforcement regulations, type and form of Osaka Prefectural Government certificate stamp and ordinances concerning the compensation of expenses incurred by witnesses are also included. The basic law for environmental pollution control, the law concerning the settlement committee, administrative organization of the committee, and related regulations are also given.

50409 **APTIC NO. 72114**

Kobe Municipal Office, Bureau of Environmental Pollution Control (Japan)

SURVEY OF PUBLIC OPINION ON ENVIRONMENTAL MATTERS. *(Kankyo mondai ni tsuite no ishiki chosa). Text in Japanese. 20p., Nov. 1973.*

A survey on environmental problems was conducted in 1973 in Kobe city. Questionnaires were given to the parents of 2520 fifth and sixth grade students from 18 elementary schools in the city. Among the 2142 who answered, 41.6% believed that Kobe city had cleaner air than other cities while 32.4% thought that it was the same as others. About 40% were concerned with automobile air pollution and close to 50% believed that air pollution had been a threat to the public. A majority of those who answered the questions agreed that control of automobile production and development of low pollution automobiles were the most effective measures to fight air pollution.

1972

50410 **APTIC NO. 71928**

Brewer, G. L.

ADVANCE PLANNING FOR AIR POLLUTION CONTROL. *Chem. Eng. World, 7(11):53-56, Nov. 1972.*

An air quality management program for nitric acid plants emitting pollutants which include nitrogen oxides is proposed. The program consists of the following five phases: an inventory of the handling equipment within the plant, including the identification of potential emission sources in terms of process material balances; source testing (if required); ambient air quality measurements; emission control analysis; and the development of a complete air management plan which includes a balance between air exhausted from buildups and processes and air supplied in a controlled economical manner. Typical NOx air pollution problems associated with nitric acid plants are reviewed along with various approaches to control and by-product recovery.

50411 **APTIC NO. 75163**

Visalli, Joseph R., David L. Brenchley, and Howard Reiquam

A PROPOSED AMBIENT AIR QUALITY SAMPLING STRATEGY AND METHODOLOGY FOR THE DESIGN OF SURVEILLANCE NETWORKS. *Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab. and Triangle Universities Consortium on Air Pollution, Symp. Stat. Aspects Air Qual. Data Proc., Chapel Hill, N. C., 1972, EPA-650/4-74-038, p. 1-18, 1974. 11 refs. (Nov. 9-10.)*

NTIS: PB 240 214/AS

A mobilized air quality sampling strategy and methodology that enables an optimum size air monitoring surveillance network to be developed at a given cost is proposed. The model develops two hypotheses into a prediction algorithm that enables advance estimates of the variance of pollutant concentration to be made. The method thus enables the allocation of the correct number of samples for the best estimate of pollution concentration levels with predetermined accuracy and confidence. Biases resulting from changes in topography and the addition of new sources are eliminated (or at least reduced) with randomized mobile monitoring. A data analysis scheme including the following five objectives is proposed: the determination of periods of time stationarity over which the variance is homogeneous or constant; the determination of meteorological parameters influencing changes in variance levels; the characterization of meteorology during each period of stationarity; the choosing of an algorithm that predicts advance estimates of the variance across a sub-area; and the development of estimates of the length of the stationary time period for the predicted variance.

SOCIAL ASPECTS

1974

50412 **APTIC NO. 71510**

Clark, Richard

PUBLIC RESPONSE TO AIR POLLUTION: A REVIEW OF THE LITERATURE. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 2.2, p. 53-66. 32 refs.*

North American and European surveys of public response to air pollution are summarized, with the majority of the studies having been undertaken in the 1960 s and early 1970 s. Although a widespread recognition of an air pollution problem is evidenced, its ranking relative to other problems is inconclusive. People who live in areas of high pollution express more awareness and concern than those living in areas with less pollution. People from higher socio-economic strata are both more knowledgeable and more concerned about air pollution than their lower soci- economic counterparts. Awareness of pollutants based on actual visual and olfactory perception is more common than knowledge of particular contaminants. Responsibility for control of air pollution is largely held to be external to the individual. Health aspects of air pollution are usually not volunteered, although concerns are expressed upon probing. The above observations are useful for predicting the degree to which individuals will either accept the responsibility for or attempt to resolve the problem through personal action.

50413 **APTIC NO. 71511**

Endo, Russell and Joyce McCarl Nielsen

BEYOND PUBLIC OPINION: BEHAVIORAL RESPONSES TO AIR POLLUTION. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 2.3, p. 67-74. 10 refs.*

Previous studies of public response to air pollution are criticized, and a hypothetical project is described for investigating situational contingencies that affect variation in pollution-related behavior. The project calls for the measurement of the behavioral responses, carpooling, under conditions of situational incentives on the one hand and an information campaign designed to increase concern and knowledge about pollution on the other. The hypothetical design allows for the comparison of responses under situations of voluntary and involuntary behavior.

50414 **APTIC NO. 71509**

Jones, Stanley

PUBLIC RESPONSE TO AIR POLLUTION IN THE DENVER AREA. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 2.1, p. 21-52. 14 refs.*

Public opinion surveys concerning the problem of air pollution in Denver, Colorado, are reviewed. In two Denver area studies where respondents were asked to rank order a list of neighborhood problems, air pollution was ranked first. The majority of respondents considered motor vehicles to be the worst cause of air pollution. Only a very low percentage (less than 5% in one study) of people complaining about air pollution problems filed formal complaints. About 90% of the respondents expressed approval toward paying $10/hr to reduce air pollution, and about 50% expressed the same sentiment when the proposed cost was raised to $50-100/yr. In one study, about 90% of the respondents favored annual pollution testing of automobile exhaust, and about three out of four of those sampled were in favor of reducing downtown Denver traffic.

50415 **APTIC NO. 71513**

Thornton, Susan, Kent Bagley, Carol Ruckel, and John Thornton

THE ROLE OF THE UNIVERSITY COMMUNITY IN THE ENVIRONMENTAL MOVEMENT. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 2.5, p. 80-86.*

The role of the university community in the environmental movement is examined. The university s most urgent role is seen as delivering input to the average citizen so that pressure may be brought to bear on government officials responsible for making decisions regarding the environment. Universities can also provide information directly at the decision-making levels of government by giving testimony at public hearings and by holding informal technical meetings with state and local lawmakers. A university community coordinating committee is suggested as the operational unit for achieving such participation in the environmental movement.

GENERAL

1975

50416 **APTIC NO. 72335**

Saito, Takeshi

RECENT MOVEMENT OF AIR POLLUTION CONTROL. *(Taiki osen boshi saikin no doko). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Sapporo, p. 1-10, 1975. (Presented at the Japan Society of Mechanical Engineers, Lecture Meeting, Sapporo, Japan, Feb. 7, 1975.)*

The present environmental standards are as follows. sulfur dioxide: hourly average for 24 hr below 0.04 ppm and 1-hour value below 0.1 ppm; carbon monoxide: hourly average for 8 hr below 20 ppm and for 24 hr below 10 ppm; airborne particulates: hourly average for 24 hr below 0.1 mg/cu m and 1-hour value below 0.2 mg/cu m; nitrogen dioxide: hourly average for 24 hr below 0.02 ppm; and oxidants: 1-hour value below 0.06 ppm. Enforcement of sulfur oxides emission control has resulted in remarkable reductions in recent years in major polluted areas such as Tokyo, Yokohama, Kawasaki, Osaka, Kobe, and Yokkaichi. The control of nitrogen oxides in automobile exhaust was enforced by improvements of automobile engines and traffic patterns, and the control of NOx from fixed sources was achieved by improvements of burner and by high stack diffusion. Environmental protection can also be achieved by energy conservation through more effective utilization.

1974

50417 **APTIC NO. 71711**

Iinuma, Kazuo

REPORT FROM INTERNATIONAL COMBUSTION SYMPOSIUM. *(Kokusai nensho shinpojiumu hokoku). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(11):54-55, Nov. 1974.*

The 15th International Combustion Symposium was held in Tokyo from August 26th through 30th, 1974 with more than 600 attendants from 22 countries. Of the 140 research reports presented in the meeting, 28 were on reaction kinetics, 25 on explosions and safety, 20 on pollution control, and 18 on combustion apparatus. The subject of nitrogen oxides control dominated the section on pollution control. The non-Zeldovich mechanism was discussed with respect to nitrogen dioxide formation within fuel rich flame and the comparison between hydrocarbon flame and hydrogen flame.

50418 **APTIC NO. 71512**

Lodge, James P.

ONE VIEW OF THE UNIVERSITY ROLE IN AIR POLLUTION RESEARCH. *In: Carbon Monoxide and the People of Denver. Miriam Orleans and Gilbert F. White (eds.), Boulder, University of Colorado Institute of Behavioral Science, 1974, Chapt. 2.4, p. 75-79.*

The role of the university in air pollution research is discussed. Problems particularly adapted to investigation by universities or research institutes are those requiring readjustment once the solution is underway and long duration efforts. Examples of such problems cited are: the effect of pollutants on alpine tundra, the effect of thinner air (high altitudes) on combustion processes, and the physiological effects of pollutants combined with air containing a lower partial pressure of oxygen.

50419 **APTIC NO. 72137**

Japan Environmental Agency

THE NATIONAL ENVIRONMENT AND POLLUTION TRENDS. *In: Quality of the Environment in Japan. p. 2-25, 1974.*

The current state and trends of air pollution in Japan are discussed. Sulfur oxides emissions are declining because of the strength of emission regulations, the desulfurization of heavy oil and smoke emissions, and the import of low sulfur crude oil. There is a trend towards improvement in the level of suspended particulates due, in part, to the revised and strengthened environmental standards which went into effect in May 1973. Carbon monoxide concentrations are decreasing in large cities due to regulations on automobile exhaust emissions. Concentrations of nitrogen oxides have worsened, and standards were recently set. Concentrations of hydrocarbons remained stable. Outbreaks of photochemical smog are more frequent. During 1973 outbreaks occurred on a substantial scale not only in the vast metropolitan areas, but also in regional cities. The number of pollution-related diseases totaled 1079 by the end of 1973 due to cumulative contamination by toxic waste substances. Countermeasures were proposed against pollution caused by substances such as mercury and polychlorinated biphenyls (PCB). Domestic production of PCBs was halted in June 1972. Their use in products such as pressure-sensitive paper which release PCBs into the environment and in closed-systems is prohibited.

1973

50420 **APTIC NO. 71698**

Japan Environmental Agency, Air Pollution Control Div.

REPORT OF INVESTIGATION ON AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTIONS, 1972. *(Kokagaku hanno ni yoru taiki osen chosa hokoku). Text in Japanese, 245p., Oct. 1973.*

The 1972 survey results on air pollution by photochemical reactions in Tokyo, Kanagawa, Chiba and Saitama were compiled by the Japan Environmental Agency. The report includes the status of nationwide photochemical air pollution, survey methods, analysis of meteorological conditions (relationships of oxidant concentration to local wind system, temperature, insolation), analysis of pollutant measurement results (oxidant maximum value and 1 hour value, concentrations of nitrogen oxides, hydrocarbons, aldehydes, peroxacetyl nitrate, and particulates, relationships between oxidants and other pollutants), stereo-structure of atmospheric pollution (variation in vertical distribution with time, atmospheric pollution in upper layer, wide range stereo-distribution of pollutants), studies on photochemical reactions by means of smoke chamber (photochemical reaction pattern, measurements of hydrocarbons, formaldehyde, total aldehyde, acrolein and PAN), and statistical analysis (atmospheric pollution distribution and diurnal variation, time difference of oxidant concentration peak, relationships of oxidant concentration to meteorological conditions and other pollutants).

1972

50421 **APTIC NO. 72108**

Higashi Osaka Municipal Government, Dept. of City Environmental Pollution Control (Japan)

ENVIRONMENTAL POLLUTION IN HAGASHI OSAKA CITY. *(Higashi Osaka-shi no kogai). Text in Japanese 210p., 1972.*

The 1972 survey reports on environmental pollution in Higashi Osaka city are compiled. The contents of the report are the description of Higashi Osaka city, general status of pollution, present pollution status, pollution control measures taken, and future plans for pollution control. The present pollution status includes data on sulfur oxides, suspended and falling particulates, carbon monoxide, nitrogen oxides, hydrocarbon concentrations, meteorological conditions, measurement by atmospheric pollution monitoring vehicles, water pollution, noise and vibration pollution, and ground subsidence. The pollution control measures taken include atmospheric, water, noise, and vibration control measures, photochemical smog control measures, status of complaints registered, assistance to small and medium scale industries, pollution control regulations and ordinances, and administrative and enforcement systems. The Higashi Osaka City Environmental Protection Regulation and Pollution Control Regulation are attached.

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